ELECTRICAL REVIEW

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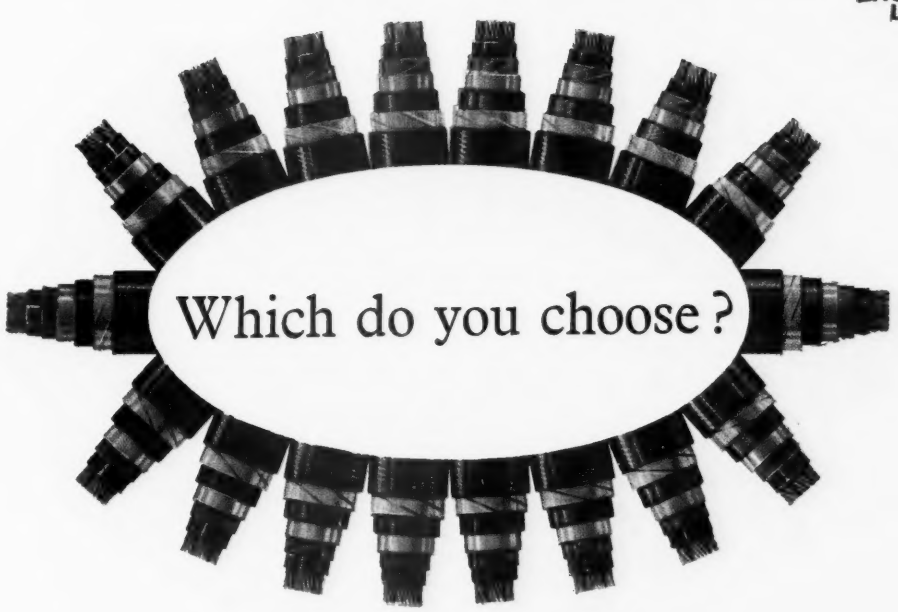

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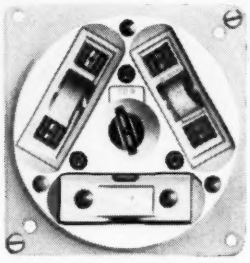

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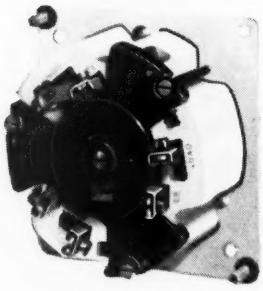

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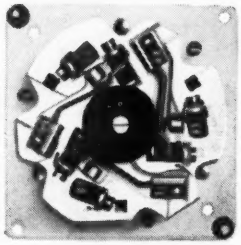

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ELECTRICAL REVIEW

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24 FEBRUARY 1956

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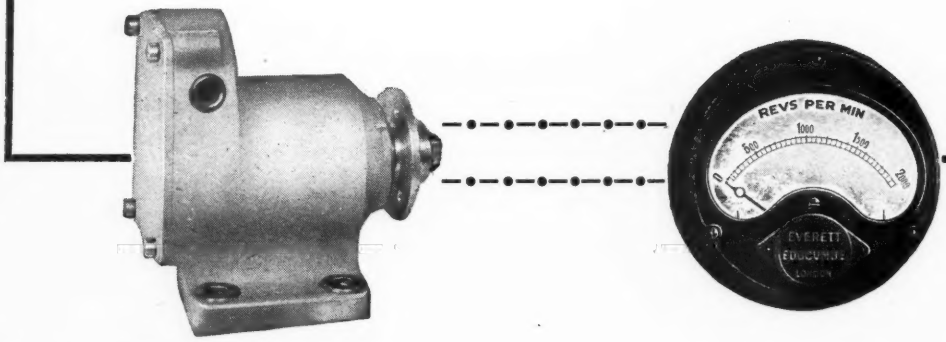
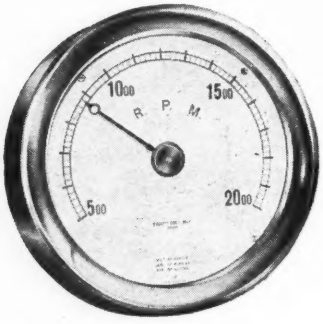
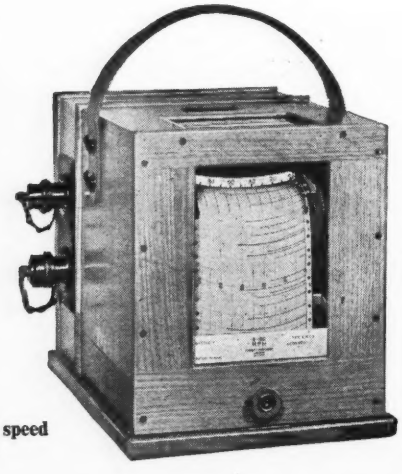
Electric Speedmeters



Typical speed transmitter for floor or bracket mounting.



Disc scale indicating speedmeter.



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ELECTRICAL REVIEW

24 February 1956 Vol. 158 No. 8 Established 1872

Interconnection in Europe

THE extent to which electricity can contribute to the advance of Europe's overall economy through the interconnection of national transmission systems is a question raised in a UNIPEDE publication reviewed in this issue. There is nothing new in the idea, since political frontiers have been for many years crossed by transmission lines. One early example was the linking of the Eastern France system to Belgium, Germany and Switzerland even before it was connected to the Paris network. The work has been facilitated by the general use of the standard frequency of 50 c/s.

Progress in this direction has been evolutionary. That is full use has been made of line kVA capacity at existing voltages before going to the cost of constructing new lines for a higher voltage to meet expected demands. Future events seem likely to confirm the practicability and economy of this policy which contrasts with the idea mooted at one time of providing very high voltage bulk transmission from one country endowed with great natural resources to others less favourably placed. Apart from overriding political considerations, the principle might be sound if the amount of energy available for export were likely to be maintained for many years. It is estimated, however, that hydro-electric resources, with the exception of those in Yugoslavia, will probably be fully developed within the next fifteen to twenty years. Even the Rhine lignites would probably be all required by local industries within that period. Frontier interchange of kWh seems destined generally to be restricted to marginal amounts as at present, that is less than 3 per cent of the total kWh consumption of the countries concerned. In some countries a two-way traffic in energy is balanced over the year. Nevertheless the value of this marginal service is out of all proportion to its magnitude in kWh/annum in absorbing spillage from reservoirs, providing for shortage of water or postponing extensions of thermal plant that would otherwise be necessary. In conflicting claims on capital for thermal generation plant and transmission lines, recognition should be given to the fact that the useful life of the former is brought to an end largely by inefficiency in turning coal into electricity compared with modern plant, whereas the lines usually remain capable of further service in secondary transmission.

A background to the general picture is furnished by a recent analysis of particulars collated in regard to the " Electricity Supply Industry in Europe " published by the Organisation for European Economic Co-operation, Paris. From this it may be gathered that technical and economic trends are very similar in industrial countries and in Britain. All alike await the coming of nuclear power stations to bridge any future gap between electrical demands and power resources.

Production difficulties caused by the dispute in the printing industry still continue and we again ask our readers' indulgence for certain deficiencies which may be noticed in this week's *Electrical Review*.

UNIVERSITY COLLEGE EXPANSION

It has been said that in some institutions full advantage is not being taken of the facilities for technical education. This certainly cannot be said of University College, London, which because of lack of accommodation is forced to turn away eight of every nine applicants for admission to its Engineering Departments, seven of them being fully qualified for entry. Plans which are now in hand, to cost £2 million, will ultimately enable the College to accommodate 600 engineering students—an annual intake of 200. The scheme is one which is of such importance to the future of engineering concerns that they should hasten to respond to the appeal for funds made last week. Already about fifty concerns have promised support to the total extent of £250,000. We feel sure that there will be a sufficient addition to this list to raise the full amount needed to bring about this very desirable expansion.

SCOTTISH AUTONOMY

Nearly eleven months have elapsed since the establishment of an independent South of Scotland Electricity Board by parliamentary action. This new organisation has now passed its initial period of readjustment and is settling down to a future which, as will be evident from our survey published in this issue, seems full of interest for its own staff, and also for those engineers elsewhere who are interested in the development of electricity supply. Suggestions had been heard that the establishment of this Board responsible for all aspects of electricity supply within its area might form a precedent for similar arrangements in other areas. The Herbert Committee showed little favour toward this idea and recommended the continuation of separate authorities for generation and distribution. It will therefore be with all the more interest that supply engineers will watch the growth of the new Scottish Board and the way in which its dual responsibilities work out. We feel sure from our own evidence that the Board will make the most of its opportunities and indeed a very high degree of initiative can already be seen in all its spheres of activity.

NUCLEAR GENERATION COSTS

At a recent nuclear congress in Cleveland, Ohio, much interest was shown in liquid metal fuelled reactors. Cost estimates have been prepared for a 200 MW station using this type of reactor and show an energy cost, based on an 80 per cent load factor, of $7\frac{1}{2}$ mills/kWh (mill=$0·001), including costs of operating an associated fuel processing plant. The average cost of energy from modern steam stations in the United States is between 6 and 7 mills/kWh. The figures quoted in Pask and Duckworth's paper in November to the British Nuclear Energy Conference were on a basis of 75 per cent load factor and did not include any processing costs. Omitting the interest charges on the initial fuel cost, not included in the American figures, it was estimated that the gross generation cost from an efficient 200 MW nuclear station would be 0·662d/kWh and from a coal-fired base-load plant on the coalfields 0·519d/kWh. The British figures subtracted a credit for plutonium, to reduce the net kWh cost of the nuclear station to 0·432d although the extent of the reduction has been questioned. The important conclusion to which one is led as more of these figures are prepared is that for some considerable time the costs of nuclear generation—by several methods—are going to approximate quite closely to current coal-fired generation costs.

TOO COMPLIANT?

In a recent letter to *The Times* Mr. H. J. Randall, chairman of the London Electricity Board, called attention to the facile way in which wage increases were granted to the employees of nationalised industries. He attributed it to the dominance in wage negotiations of former trade union leaders, now representatives of the boards, a statement which was strongly repudiated by Lord Citrine, chairman of the C.E.A., in a reply. Is not the real reason the fact that public welfare is so dependent on nationalised services that threats of stoppages are far too effective? Mr. Randall would, he implied, resist these claims but he was compelled by the Central Authority to accede to them—the matter being treated nationally, not regionally. Here again Lord Citrine entered an emphatic denial. A further letter from Mr. Randall published in *The Times* of 16th February added little to the argument except perhaps to disclose that "A Chairman's Protest" arises as much from a clash of personalities as from a divergence of outlook. Increases granted to workers in nationalised industries are used as an argument by others in non-nationalised industries, and so the movement goes on over and over again. Mr. Randall said that it was accepted that the public would pay. He might have pointed out that the workers themselves form a large proportion of the public and, in effect, pay their own wage increases in the shape of higher prices. It is only the realisation of this which will halt the inflation from which all are suffering.

DISTRIBUTION CUTS

The Minister of Fuel and Power assured the House of Commons last week that there would be no "disproportionate" cuts in rural electrification as a result of the decision to reduce expenditure by Electricity Boards. In the meantime some of the Boards have warned rural dwellers in their areas that they must expect to wait longer for their supplies. The Minister also said that he was granting no finance for hire-purchase purposes to the Central Electricity Authority for 1956-57. This was rather a strange way of putting it for the Minister does not "grant finance" to the C.E.A. It is probable that in approving estimates of expenditure the Minister will ask the C.E.A. to tell the Electricity Boards not to use any "new" money for hire-purchase purposes. It does not mean that hire-purchase will cease altogether.

The SCOTTISH INHERITANCE

South of Scotland Electricity Board's Area and Plans Surveyed

IN 1954 Parliament passed the Electricity Reorganization (Scotland) Act by which the South of Scotland Electricity Board was established as an autonomous authority to take over (on 1st April, 1955) control of all aspects of electricity supply in Southern Scotland and answerable, like the North of Scotland Hydro-Electric Board, to the Secretary of State for Scotland. The new Board has absorbed the former South East and South West Scotland Electricity Boards and the corresponding Divisions of the Central Electricity Authority and at the end of September last employed a total of 10,974 made up of 7,783 operative staff and 3,191 administrative, technical and clerical staff.

The chairman, Mr. J. S. Pickles, was formerly the chairman of the South West Scotland Board and the first deputy chairman, Sir Norman Duke, who retired last month, was formerly chairman of the South East Scotland Board. The principal officers of the new Board have almost entirely been drawn from the previous Boards and Divisions.

The change-over of responsibility has hardly affected consumers as the staff and organization dealing with distribution and service remained unaltered and the ten sub-areas existing within the two earlier Boards, each with its own manager, are generally unchanged. These territories, now called areas, with their populations, number of consumers, and annual sales in 1954/55 are given in Table I and general statistics in Table II (see page 286). The total consumption of electricity in the year to 31st March, 1955, in the area of supply covered was 4,601 kWh, this representing about 7½ per cent of the total consumption of electricity in Great Britain.

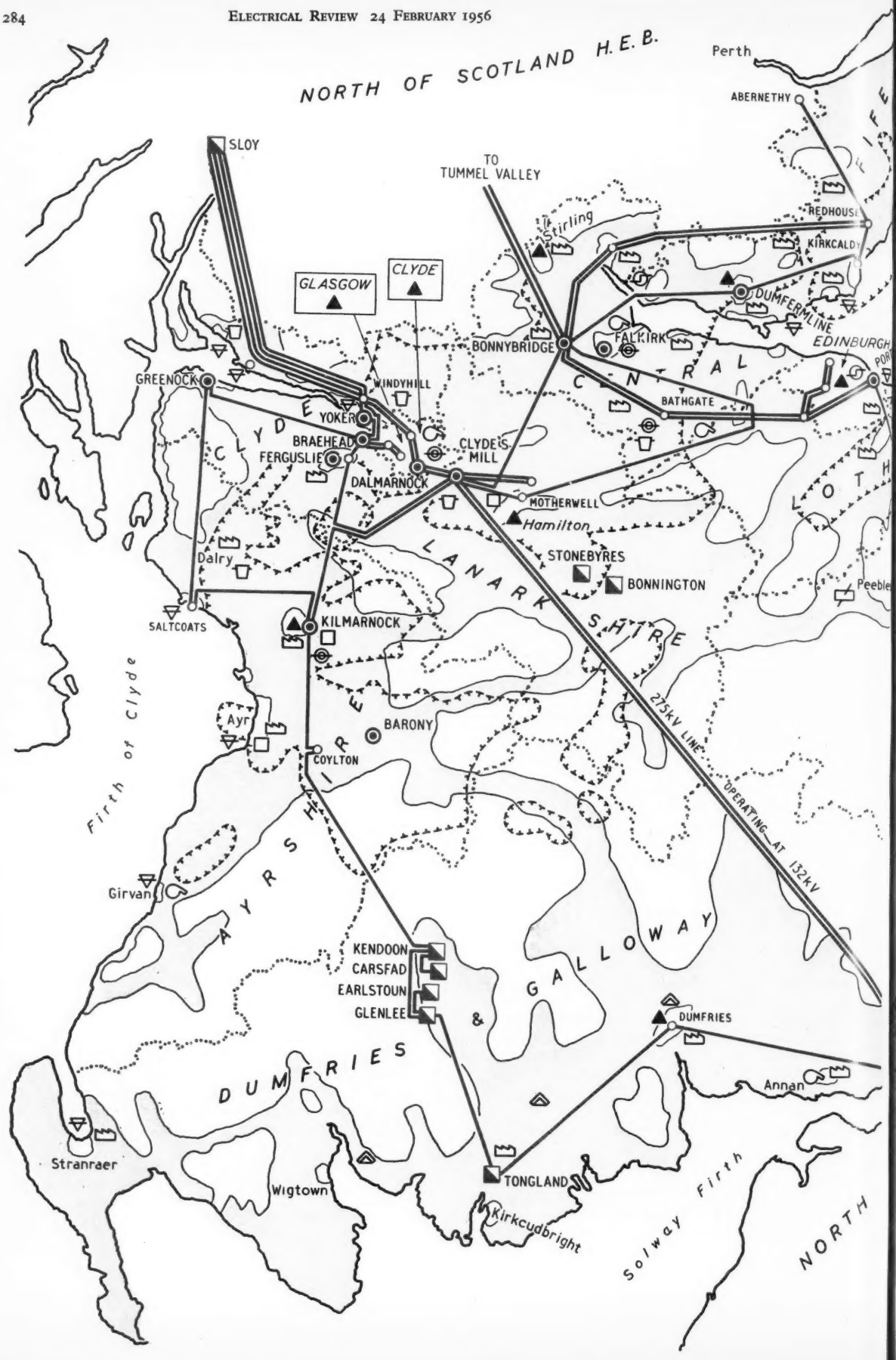
The new Board takes over an area of widely divergent industries and population densities ranging from the Tay and Loch Lomond in the north to the Border; and in the south supplying a small area in Northumberland nominally coming under the North Eastern Electricity Board. There are large areas of intensely cultivated farm land in Fifeshire, Ayrshire, the Lothians, Berwickshire and that area in the south known as Galloway. There are however wide areas of mountain and moorland practically devoid of population.

In central Scotland mining is the most important industry and last year 22·5 million tons of coal were produced from Scottish pits. The National Coal Board plans to increase annual output to 30 million tons by 1965, a quantity far in excess of Scottish needs. New collieries are being built in many areas, there being a steady move away from the older pits in Lanarkshire to new ones in Ayrshire, the Lothians and Fifeshire, particularly the last area. In some cases miners and their families are shifting as communities from an old pit in one part of the country to a new one in another.

Steelworks are being expanded, a large refinery has been built at Grangemouth on the Forth capable of supplying well in excess of Scotland's present needs, and impressive industrial estates have been springing up in the neighbourhood of Glasgow and to a lesser extent, Edinburgh. The shipyards and heavy engineering works of the Clyde and the central industrial area need no introduction. Around Glasgow British Railways envisage extensive electrification during the next decade.

The majority of the Board's consumers are in the area within a twenty-mile radius of Glasgow, where the population density is as high as anywhere in Britain. Elsewhere with the exception of Edinburgh and a few sizeable towns the consumer pattern is a blend of small market towns, farmland and a little light industry scattered over an area, with a block of desolate moorland separating one area from the next. In the area formerly served by the South West Scotland Board there are about 9,700 farms of which 7,760 or 80 per cent had been connected to the public supply before 1st April last year. In the former South

Title Picture: Shipyards on the Clyde. In the distance on the left bank can be seen Braehead power station, completed two years ago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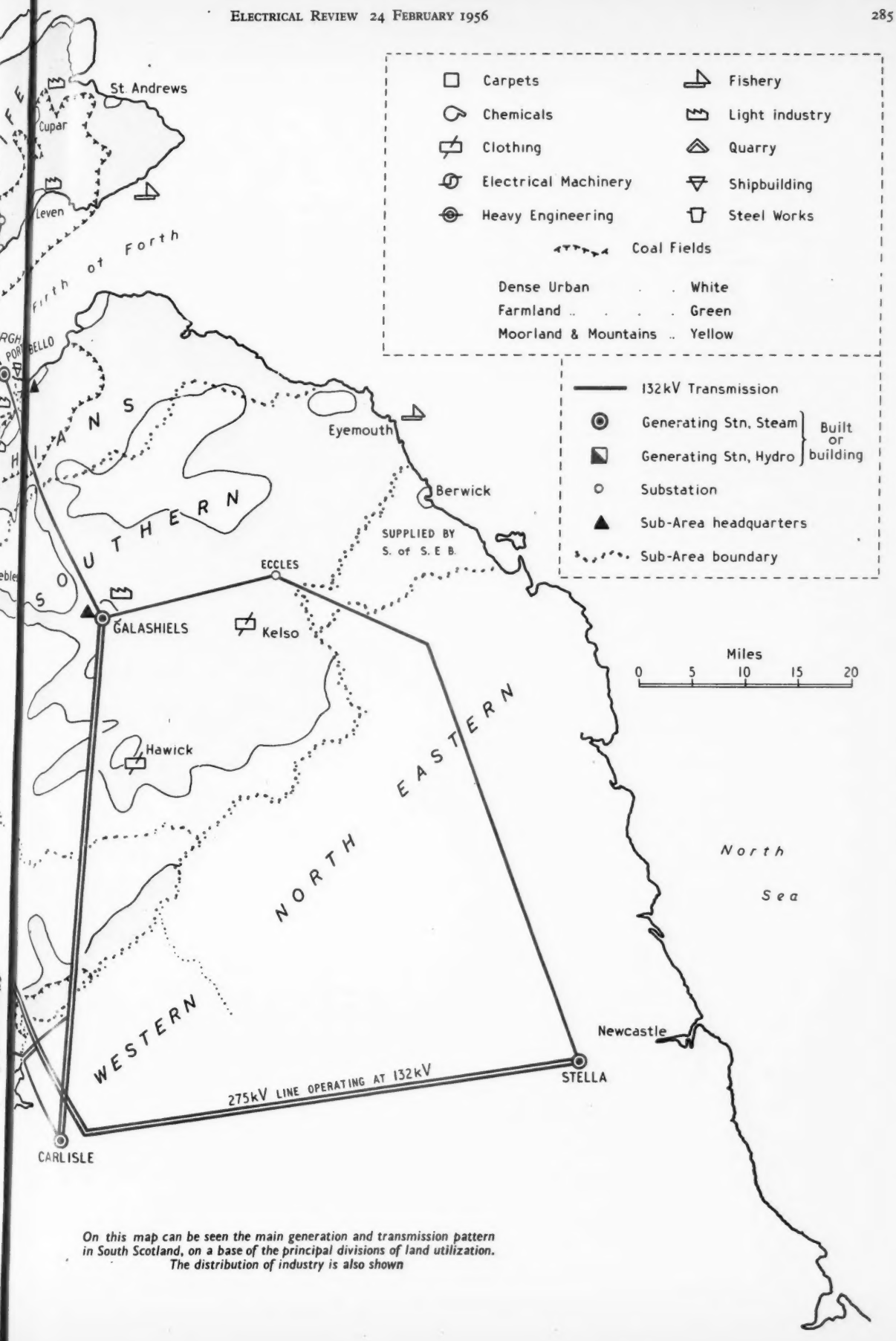


On this map can be seen the main generation and transmission pattern in South Scotland, on a base of the principal divisions of land utilization. The distribution of industry is also shown

Braehead is a beautifully kept station in which there is no separation of the turbine and boiler houses

East Scotland area the number of farms connected at 1st April, 1955, was about 2,970 out of a total of about 5,900. Thus there is still a considerable amount of rural development to be carried out in parts of the area although some of the remaining farms will always be inaccessible to public supplies except at unreasonable expense.

To look after consumers' needs 78 service centres scattered throughout the area are operated by the Board. These function as showrooms, centres for the payment of accounts, and places where advice can be given on the uses of electricity. The Board's head office is at 351, Sauchiehall Street, Glasgow, but a lack of office accommodation in the Glasgow area involves an unfortunate degree of separation between various parts of the head office organization which is scattered throughout the city.

In the spheres of generation and transmission the new Board can show accomplishments and plans as varied as those of any other area in the Kingdom. At Barony, near Ayr, it is building a power station designed to burn coal washery slurry, seen at present as ugly pools of slime despoiling fertile acres in the vicinity of existing collieries. This will be supplied to the station at a delivery price per ton reckoned in shillings, and only about one-quarter of normal power station coal prices: even allowing for the low calorific value and high water content the station will probably have the lowest generating costs of any in the country. At Kincardine, within sight of the first road bridge across the Forth, there is being built a new 720 MW power station which will rank among the three or four largest in the country. At Portobello, Edinburgh, two 60 MW sets of advanced design are already running which have been for two years the most efficient producers of electricity in the country.

TABLE II.—LEADING STATISTICS OF SUPPLY 1954-55

Simultaneous maximum demand	1,285 MW
Load factor	44·7% approx
kWh sold	4,601 million
Consumers	1,205,328
Farms supplied	10,731
Capital liability outstanding	£70 million
Annual revenue	£26 million

The Atomic Energy Authority is to build a nuclear station near Annan, Dumfriesshire, and the Board itself is actively pursuing the question of constructing a nuclear generating station of its own probably in the south western part of its area. Such a course of action would commend also the development of an associated pumped storage scheme for which the mountainous areas of Galloway provide well-situated sites. A 275 kV line has been built from Carlisle to the existing power station at Clyde's Mill, near Glasgow, following for the most part the valley of the Clyde and the route of the railway on its journey south; this line is at present operating at 132 kV.

Generation in the area is principally by steam plant but with the exception of the North of Scotland the area derives more of its electricity from water power than any other part of Great Britain. Of a total existing generating capacity at 1st August last year of about 1,252 MW, 119 MW, or about 9½ per cent, was hydro-electric and in the year 1954-55 this supplied 400 million kWh of a total sent out of 4,637 million kWh. In addition to this power from its own hydro-electric stations the area obtained about 400 million kWh from the North of Scotland Hydro-Electric Board. Transfers of power take place between Scotland and England both via the Carlisle link and the Eastern link to Newcastle. No set pattern of exchange can be said to occur as in some years there is a net import on the east and a net export on the west and in other years *vice versa*. The grid system is still operated as an entity energy exchange being regulated to achieve

TABLE I.—DIVISION OF THE BOARD'S TERRITORY

Area	Area (sq miles)	Population	Consumers at 31/3/54	Consumption 1954-55 (million kWh)
Lanarkshire	906	666,409	192,826	1,026
Glasgow	27	862,384	266,392	945
Clyde	373	586,948	174,113	748
Edinburgh	54	471,512	156,417	485
Ayrshire	1,100	322,275	94,734	349
Central	391	306,705	77,834	354
Fife	505	313,000	87,899	265
Lothians	587	154,232	41,086	183
Dumfries and Galloway	2,593	151,167	42,706	168
Southern	1,624	123,238	27,332	77

maximum economy at any instant. However for some years there has been a small net import of energy into Scotland from England.

The generating stations taken over are as given in Table III. The generating plant programme envisaged to meet the increasing demand is being covered by an additional 12·5 MW set in Dunfermline, by a further 60 MW set in Portobello station, by reconstruction at Dalmarnock to house two additional 60 MW sets, by the building of the new Barony station and, principally, by the large new station at Kincardine where the first set should go into operation in 1958. The Galloway hydro-electric plant is capable of a considerable increase in kWh output by extensions to the catchment area. Although this would be costly it is possible that such development may take place.

Both at Kincardine and at Barony the Board is working in close co-ordination with the National Coal Board which in the case of the former station is to sink three new pits in the vicinity of Kincardine to supply the necessary coal. At Barony the station is being constructed close to an existing colliery where a new shaft and washery, etc., very close to the power station are already nearing completion.

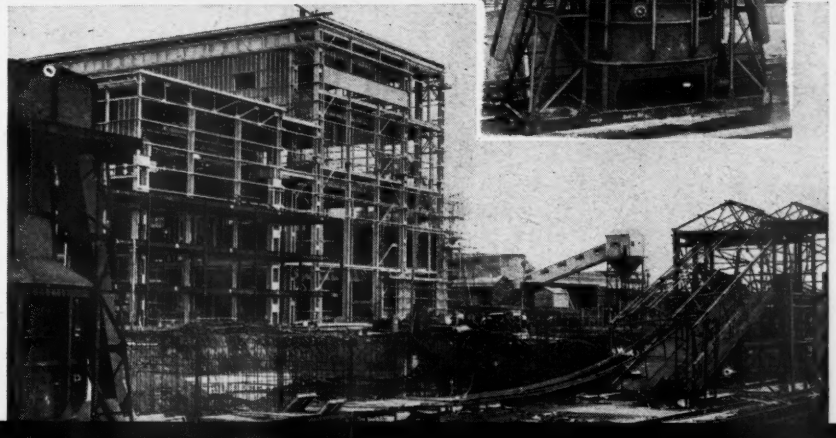
Barony is a most interesting development being the first power station in Britain specially designed by the supply industry for burning washery slurry. This slurry of which the National Coal Board has undertaken to supply 170,000 tons per year, both from the adjacent collieries and from other sources, is a sticky plastic material washed off the coal in its preparation for market. It contains 35 per cent moisture and even when this has been removed only 20 per cent of the remaining solid is actual coal. It is necessary to have a large furnace to enable full use to be made of such low-grade fuel. Handling the slurry presents the biggest problem of all as it has a consistency rather like that of plasticine. It is handled by grabs on delivery and deposited in four special bunkers, one of which can be seen in our photograph. These bunkers each hold about 36 tons of slurry and at the bottom is a plate rotating at 3 r.p.m. Internally a plough bucket is fixed so that as the mass of fuel rotates on the bottom plate the slurry comes into the bucket and is led out of the bunker, breaking up into lumps and falling on to a conveyor belt.

From here it is taken to the mixer house where other low-grade dry fuel of a high ash content, otherwise unsaleable, can be added to it if required. This mixer house is seen on the right of our illustration. The fuel is taken to further bunkers, similar to those previously described, at the top of the boiler house, one bunker being provided for each of the four pulverizing mills provided per boiler. The mills are of the " Kramer " type used on

TABLE III.—GENERATING STATIONS IN THE SOUTH OF SCOTLAND

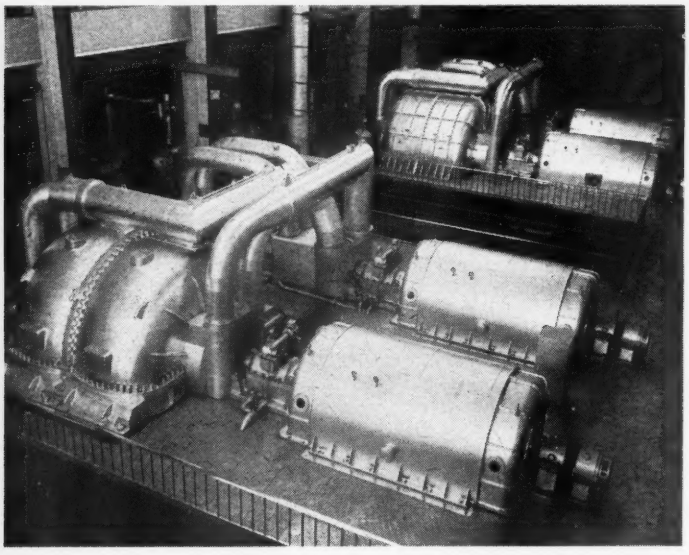
Thermal	Present Capacity MW	Future Additions MW
Clyde's Mill	277·5	
Portobello	212·5	1×60·0
Braehead	200·0	
Dalmarnock	137·5	2×60·0
Yoker	100·0	
Kilmarnock	85·0	
Bonnybridge	70·0	
Ferguslie	16·3	
Dunfermline	13·0	1×12·5
Greenock	8·0	
Falkirk	7·5	
Galashiels	5·6	
Barony		2×30·0
Kincardine		6×120·0
	1,132·9	612·5
Hydro		
Galloway — Tongland ...	33·3	
Galloway — Glenlee ...	25·0	
Galloway — Kendoon ...	21·0	
Galloway — Carsfad ...	12·0	
Galloway — Earlstoun ...	12·0	
Lanarkshire — Bonnington	9·8	
Lanarkshire — Stonebyres	5·7	
	118·8	

Above : The slurry pond at Barony Colliery, typical of many dotted around the country's mining areas



Right : Progress at Barony. On the left is one of the special bunkers described, on the right the mixer house where dry fuel can be added if required. Inset can be seen the complete bunker

Extensive use of glass and pre-formed concrete has enabled a large degree of weather-proofing to be achieved before plant erection starts at Barony



The first two 60 MW turbo-generator sets at Portobello. The overall efficiency of this new part of the station is about 31·4 per cent.

Below: Galloway is a land of pastoral countryside and moorlands. Earlstown hydro-station can be seen in the distance. Below right: Early work in progress on the site of the Kincardine station. In the background is the swing bridge across the Forth

the Continent for brown coal. They are hammer mills, and furnace gas is tapped off from the boilers and drawn in with the fuel thus drying out the moisture present. The station will have two 30 MW sets and four 150,000 lb/hr boilers designed particularly for this class of coal. The boiler efficiency is expected to be about 79 per cent, under steam conditions of 600 lb/sq in and 850 deg F. As the boilers have been specially designed to use slurry, the efficiency would fall if good coal were used. It has been estimated, in conjunction with the Coal Board, that 20-25 years' supply of the slurry is certainly available.

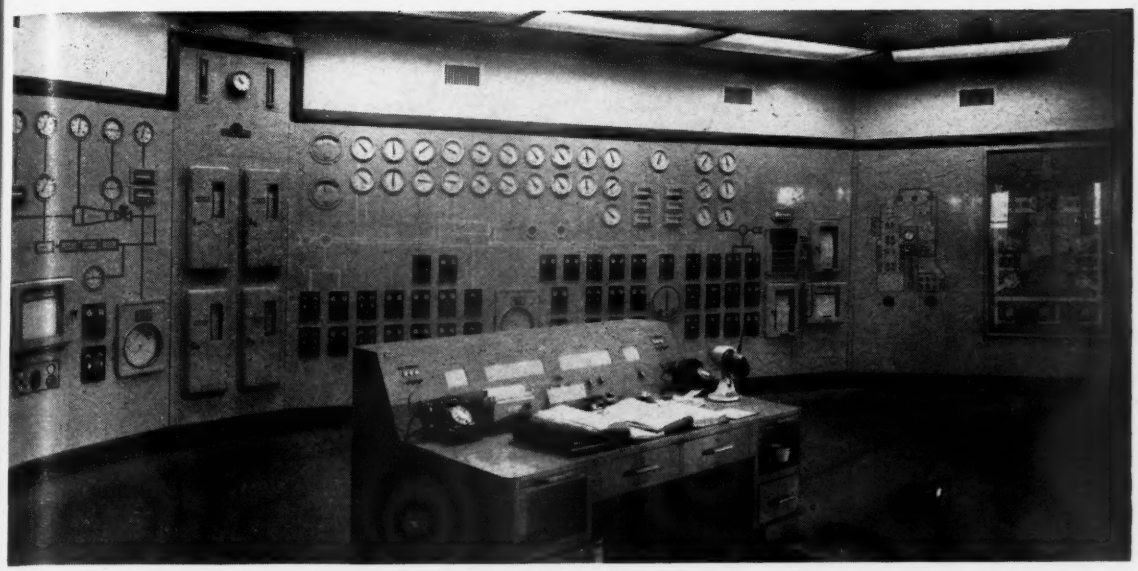
The Kincardine station will ultimately have six 120 MW sets operating with steam at 1,500 lb/sq in and 1,000 deg F with re-heating to the same temperature. Construction here has only just begun and excavation for foundations is well under way. An access road to the site has been completed.

The reconstruction of Portobello power station during the past few years has been a splendid engineering achievement. Without lengthening the turbine house three 60 MW sets have been installed in the space formerly occupied by four small sets. The length of the boiler house also remains unchanged although expansion backwards and upwards has necessarily taken place to accommodate three new boilers with a total rating of 1,620,000 lb/hr. The new turbines are unusual in consisting of a separate h.p. and l.p. section each with its own 30 MW alternator, the two being solidly coupled electrically. The control room arrangement is also of interest as both the boiler and the turbo-alternator plant associated together as a unit are controlled jointly from a panel and room, provided separately for each of the new units.

In the sphere of transmission the Board acquired a reasonably complete grid network which can be seen on our map. About 900 miles of line are operating at 132 kV connecting with the power stations and supplying 31 main

TABLE IV.—ANALYSIS OF CONSUMPTION 1954-55

Class	Thous. kWh	Inc. or dec. on 1953-54 (per cent)
Domestic	1,337,720	+ 11·5
Farm	88,409	+ 20·0
Commercial	655,575	+ 8·2
Industrial	2,414,750	+ 11·2
Public Lighting	84,846	+ 11·2
Traction	19,847	− 25·5



One of the control rooms at Portobello for a unit boiler and turbo-generator. On the right can be seen mimic diagrams of the soot blower and damper situation at any moment

transformer stations at the load centres. An 85 mile long 275 kV double circuit line, temporarily operating at 132 kV, connects from a new substation at Clyde's Mill to the English system at Carlisle. This was completed only a year ago. Six 132 kV lines feed power from the North of Scotland Hydro-Electric Board system in the Scotland Area, at Windyhill in the north of Glasgow, Bonnybridge and via Abernethy. The new Barony power station is linked to the Coylton substation shown by 33 kV lines. The transmission map itself reveals the distribution of consumers—a close network exists in the central belt of Scotland with three broadly parallel feeds from the north and from the south.

Parts of the area have always been noted for a pioneering spirit in rural development. In the Dumfries area single-phase distribution and the use of earth leakage circuit-breakers were established before the last war and as can be seen from the farm figures quoted elsewhere in this article, in the old South West Board's area particularly, about 80 per cent of the farms are now connected. (Table IV shows the nature of the sales of electricity.) Connection of the remainder where a high connection charge to an individual potential consumer would be inevitable is assisted by arranging to supply several farms as a group, sharing the costs of the group development equitably among them. A recent supply of interest was to the moor-land village of Riccarton, in Roxburghshire, where no road exists and only a railway line gives access.

(To be concluded)

Pole-Changing Induction Motors

AT a meeting of the Utilization Section of the Institution of Electrical Engineers on 16th February, three papers were presented on the 3:1 pole-changing induction motor. The first two, by Dr. T. H. Barton, Mr. O. I. Butler (Sheffield University) and Mr. H. Sterling (Lancashire Dynamo), dealt with its theory and characteristics and with its applications; the third, by Professor G. H. Rawcliffe and B. V. Jayawant (Bristol University), described the development of a new machine with only one three-phase winding.

Paper No.1 discussed the implications of the principle of balanced operation of a motor on a harmonic field produced by the interconnection of parts of each normal phase winding. The authors showed that the overall performance of such a motor with a 3:1 speed ratio was comparable with that of two separate machines having corresponding pole numbers and the same frame size as single-speed designs. They demonstrated—for the first time, they believed—that in predicting the performance characteristics of an induction motor from design data the effect of pronounced space harmonics of m.m.f. could be taken into account with reasonable accuracy, providing leakage reactance of the secondary circuit included the skew-reactance component, which, however was less important during heavy currents, i.e. when starting at full voltage.

Applications of 3:1 pole-changing were divisible into those utilizing symmetrical and asymmetrical connections of the primary windings. The former case included dual speed drives where operation was normally at full speed, but one-third speed was required for accurate positioning, for machine tools and hoists, for pumps and axial-flow fans, or for frequent start-stop and frequently reversing devices. Asymmetrical connections gave a.c. dynamic braking without any tendency for the motor to run up in the reverse direction. The zero-sequence connection, which gave regenerative braking, was obtained by connecting all three phases in series or in parallel across a single-phase supply.

The motor described in the third paper gave nearly the full frame rating for both speeds and compared favourably both in torque and continuous horse power with normal types and in addition was free from crawling torques. The number of control leads (eleven) was regarded as not unduly large and the switch controller was relatively simple. The winding was believed to be the first satisfactory example of its type to be devised.

EUROPEAN POWER POOLS

SCOPE FOR INTERCONNECTION OF NATIONAL NETWORKS

IN a publication entitled "Pools and European Electrical Economy," the International Union of Producers and Distributors of Electrical Energy (UNIPEDE) discusses present and possible future electrical interconnections of the several countries. It is pointed out that national frontiers have long been crossed by transmission lines, the 220 kV network being now continuous from Naples to Hanover and from Nantes to Vienna.

Most of the electricity produced meets firm demands, and exchanges with other countries are as small as they are between internal areas in each country. The amount available for foreign exchanges is marginal and forms only a small percentage of the total generated and is usually limited to temporary conditions (e.g. shortage of water power capacity). Since electrical energy can be transmitted only over its own lines, any loss of load is not compensated for by the great diversity of traffic enjoyed by the railways and is therefore more likely to lead to economic difficulties.

Voltage levels, which vary from one geographical area to another, are determined economically by local electrical loadings, the maximum being raised by constructing new lines at higher voltages when increase of generating capacity has saturated the existing level. This is done by the superposition of successive levels by constructing new lines at higher voltages closely interlinked by transformers with the earlier ones, all of them participating in the general power transfers. Such considerations rule out any proposal for a European supergrid of a special very-high-voltage network, which would leave relatively short-distance lower-voltage transmission to national networks. To extend the higher level to areas where transfers can still be made at a lower voltage would be wasteful of capital that could be far better expended on new means of production until transmission systems have become fully loaded.

Continental Experience

There is now sufficient experience of linking on the Continent to permit the forecasting of loading requirements of new international connections except for the cross-Channel link between England and France. Design of the necessary control devices has always been ahead of requirements.

Political frontiers have formed no obstacle to the construction of lines or to questions of parallel operation, regulation or switching. The only factors of importance impeding international exchanges are due to customs and currency regulations. Comparisons between large and small countries should take into account that exchange possibilities vary as the perimeters, while consumptions vary as the surfaces.

Production and transmission developments must be considered together. In particular, lines connecting hydro and thermal areas may be fully loaded during the night when many hydro stations spill simultaneously. There are thus optimum conditions for hydraulic spillage in relation to transmission line congestion. To duplicate a line which is saturated for only a few hours in the year may save less coal than if the same capital were devoted to the construction of an extra hydro station.

One of the main characteristics of atomic energy power stations is that, the weight of fuel being insignificant, they will tend to be situated where generation by conventional means would be more expensive, thus reducing transmission distances. Capital therefore should not be frozen in constructing transmission arteries that would not be economically justified in the near future.

There remains the question of the advantage that would accrue from systematically meeting the demand of certain countries by stations built in an adjoining country instead of by simple exchanges of power. Prospects of exhaustion of economically exploitable new water resources within the next 15 to 20 years would militate against this development generally and confine it to seasonal exchanges. Similar factors would apply to the extraneous use of the Rhine lignites. Substitution of colliery rejects for saleable coal in power stations will soon be no longer possible and future extensions of thermal generating capacity will have to be based on otherwise saleable coals. The heavier burden on the coal market would, however, be somewhat reduced by the fact that electrical development results not only from new uses of energy but also from its substitution for other forms of energy. Concern as to the reaction on thermal generation of the inevitable reduction of the part played by hydro installations, however, is dispelled by the possibilities of nuclear energy.

Three countries with great potential water-power resources are Norway, Austria and Yugoslavia. Norway would naturally give priority in export to Sweden, which is now in sight of depletion of its own resources, and to a relatively small amount to Denmark, but preference would be given to internal consumption by the production of aluminium from bauxite. Although Austria is surrounded by consumer countries, it will need all its own available potential in about twenty years' time.

Yugoslavia has a usable potential of about 60,000 million kWh a year in falls having a favourable seasonal availability, but in view of the nature of the ground the building of reservoirs is risky. The only economic large scale outlet would be Italy until Austria, nearer the largest markets, has exhausted its available falls. The main difficulties are, however, political.

Interdependence of the economies of the various European countries causes strong and unexpected growths of consumption to be nearly simultaneous. This tendency limits the feasible extent of long term reciprocal aids, as distinct from the much more important occasional exchanges during short periods.

Industrial Particle Accelerator

WE learn that British Insulated Callender's Cables, Ltd., is now installing a 2 million volt particle accelerator at its research laboratories at 38, Wood Lane, London, W.12. This is one of the first particle accelerators to be installed in the United Kingdom for purely industrial researches.

The accelerator is of the Van de Graaff type, housed within a pressure container operating at about 300 lb/sq in. It is a universal apparatus which can be adapted to supply high energy beams of electrons, positive ions, neutrons or gamma rays.

The installation will be used for general research into the effects of high energy irradiation on materials used in cable and capacitor manufacture. In particular, it will be employed for continuing the researches on the effect of irradiation on polyethylene, on which the Company has carried out considerable work during the last few years.

Electrical Contractors' Dinner

RELATIONS WITH SUPPLY AUTHORITIES

PROMINENT men from all branches of the electrical industry and other walks of life were present with many members of the Electrical Contractors' Association at the annual dinner of the Association and its allied organisations at Grosvenor House, London, W.1, on 14th February.

Dr. Charles Hill, the Postmaster-General, was the principal guest and undertook the proposal of the toast of the E.C.A. and Allied Associations. In the course of his remarks he said that the Post Office was a good customer of the electrical industry—to the extent of about £20 million a year. For the first time the director-general of the G.P.O. was an electrical engineer and the department employed 75,000 electrical engineering workers. Dr. Hill said that there were now 6¼ million telephones and 6,000 exchanges; he mentioned the pilot electronic exchange at Richmond, the introduction of subscribers' trunk dialling and the transatlantic telephone cable.

The reply to the toast was made by Mr. R. A. Marryat, B.Sc. (Eng.), A.M.I.E.E., the president of the Associations. He said that electrical contracting was an essential part of the building industry and electrical contractors were closely concerned in the application of electrical engineering throughout the whole of the country's industry. They worked closely with the electricity supply authorities and the manufacturers and were represented on many important electrical committees.

At the present time when there was too little labour and not enough production there must be more automation

1. The Postmaster-General with Mr. L. C. Penwill (director and secretary). 2. Sir George Nelson and Mr. W. J. Jones. 3. Messrs. T. W. Heather, T. E. Alger and L. C. Penwill. 4. Messrs. E. A. Reynolds, E. G. Plucknett, W. T. Trace and A. V. Milton. 5. Messrs. R. E. Silvey, C. R. King, V. C. H. Creer and A. B. Wildsmith. 6. Mr. T. W. Heather and the President. 7. Messrs. S. N. Watkins and R. A. Marryat. 8. Messrs. A. F. Plummer, R. L. Booth, C. C. Hyams and P. G. Wallis. 9. Messrs. H. H. Townsend, S. L. M. Barlow, C. Comber and Dr. Phillips

which would increase the work and responsibility of the electrical contracting industry. He welcomed the Government's decision to attempt to stabilise the cost of living. They were anxious, within the limits of economic considerations, to raise their operatives' standard of living but any improvement was automatically frustrated by further rises in the cost of living. It was wrong to think that increased wages could be met from profits. What was needed was for the nation to produce more for each pound of wages paid. In their own industry output as measured by work done was substantially less than it was before the war in spite of increased mechanisation.

While urging the Government to examine the effects of trade unions' restrictive practices, he recommended a cautious approach to the findings of the Monopolies Commission on trade practices in industry. There should be interference only if such practices were found to be damaging to the country.

Mr. Marryat also urged the Government to review its own expenditure in an endeavour to relieve industry of the present burden of taxation.

Proposing the health of the guests, Mr. H. S. Wathes (vice-president) said that the Association owed much to Mr. C. R. King, chairman of the East Midlands Electricity Board, for his broadminded attitude towards electrical contractors; since nationalisation he and his Board had co-operated wholeheartedly with them. Mr. V. C. H. Creer, chairman of the Electric Lamp Manufacturers' Association, was also a member of the Electrical Fair Trading Council and he had constantly given the greatest consideration to the contractor's point of view.

Mr. C. R. King, C.B.E. (who was replying as chairman of the Council of the British Electrical Development Association) said that the good relationship in his area between the electricity supply people and the contractors dated from before nationalisation. He thought that his job was to supply electricity at the lowest possible price and he did not believe that this could be achieved by contracting and the sale of appliances.

He commended to the contractors' attention paragraphs 460 to 466 of the Herbert Committee's report ("Retail Contracting and Trading") but he did not think that any Board could prepare separate accounts for retail trading and contracting work.

It was the duty of the E.D.A., the Area Boards and the contractors to convince consumers that generally wiring was inadequate and that installations twenty or thirty years old needed thorough overhaul or replacement. Before the war the annual revenue per consumer was £4 or £5; now it was £20 or more. With expensive coal, electric space heating would become a regular thing and many old installations would not be able to take it.

At present advertising was restricted but he hoped that relief would come and then they could go all out to secure that every home in the country was properly equipped for the use of electricity.

Mr. V. C. H. Creer, who also responded to the toast, said that E.L.M.A. appreciated its meetings with contractors and believed in organised trading which would be recognised as sound when the outcry about "monopolies" ended. The improvement of the level of illumination provided more enjoyment for the people.

Mr. C. J. Veness proposed the chairman's health. He said that it was the first time in the Association's history that son had followed father as president. But Mr. Marryat had blazed his own path and had done much in the matter of apprenticeship training and technical education. He had also done much useful work as a member and chairman of the Association's Technical Committee. A brief acknowledgment was made by Mr. Marryat.

Free-Piston Compression

PARTICULARS of installations of gas turbo-alternators using free-piston compression were given in a paper presented by Messrs. E. S. L. Beale (consultant) and P. Watson (Alan Muntz & Co.) at a meeting of the Diesel Engineers' and Users' Association. The type dealt with was the "gas generator" in which the air from the compressor was delivered to a two-stroke diesel engine having opposed free pistons, i.e. with their motions controlled by gas pressure instead of by a crank and connecting rod. The products of combustion and excess scavenge air entered a gas turbine at the diesel back pressure of 45 lb/sq in or more. Their temperature was about 450 deg C, which was 200 deg C below that at which troubles from vanadium were normally expected. The high thermal efficiency of the gas-generator cycle was due to the high overall compression ratio, usually about 1,000 lb/sq in at full load.

Three 700 kW sets using single gas generators rated at 1,250 gas h.p. were now in operation, these were in Metlaoui (Southern Tunisia), Cuba and Detroit; the first mentioned had achieved the greatest number of operating hours (15,500) of any free-piston plant since the beginning of August last, during which period there had been no falling off in efficiency or corrosion or deposition troubles. A further 700 kW turbo-alternator and two gas generators were to be added, one of which would be stand-by.

Among the sets now installed or under construction, Electricité de France had two 1,500 kW sets with twin gas-generators at Ajaccio, Corsica, with a turbine efficiency (gas h.p. at turbine entry to shaft h.p.) given as 88 to 89 per cent and another 1,500 kW set at Rheims. The same authority also owned the largest free-piston plant in operation, a 6,000 kW unit at Cherbourg, which was equipped with eight gas generators, and one of the same output with six gas generators to be installed shortly at Tours. A 1,500 kW experimental unit had been built for the French Admiralty.

Electricity Supply Developments

AT a recent open meeting of the Chief Technical Assistants' Association, Mr. E. R. Wilkinson, C.M.G., previously commercial manager of the Central Electricity Authority, gave an address on "The Electricity Supply Industry". Mr. Wilkinson himself admitted the Herculean nature of the task in trying to compress the subject into a forty-minute talk. He did, however, succeed in reviewing technical and legislative developments from the date of the 1882 Act to the recent Herbert Report upon which he refrained from making any personal comment in view of the short time available for adequate study of it.

The discussion tended, nevertheless, to centre upon these most recent recommendations and the Association's chairman, Mr. J. R. Hill, saw some similarity to the recommendations of the McGowan Report of 20 years ago; with the familiar structure of Electricity Commissioners—C.E.B.—undertakings perpetuated under the name of C.E.A.—Generation Boards—Area Boards. Other speakers described the recommendation that the several tariffs should reflect costs as being the antithesis of tariff standardizations.

Mr. Wilkinson, in reply, said that if the tariff-cost relationship were carried to extremes it would result in about 14 million tariffs, for that was the number of consumers. He said that load factors had been improved from some 5 per cent to 40 per cent over the years, but since in Canada a figure of 60 per cent was achieved, there was some room for improvement.

Private Research Reactor

FIRST IN BRITAIN TO BE CONSTRUCTED BY A.E.I.

LAST week the Associated Electrical Industries Research Establishment and the A.E.I./John Thompson Nuclear Energy Group jointly announced that they were to construct Britain's first privately owned research reactor at Aldermaston Court in Berkshire, the research establishment of A.E.I. The site for the reactor has been cleared and levelling and design work completed.

The reactor will be known as "Merlin" (medium energy research light-water-moderated industrial nuclear reactor) and has been designed and will be constructed by the A.E.I./John Thompson Nuclear Energy Group. Uranium fuel will be provided by the Atomic Energy Authority.

The reactor, which is of the "swimming pool" type, is felt to be simple and versatile and suitable either for research and engineering investigations or for training purposes. It will be used not only by the companies of the A.E.I. Group but will also be available to universities, technical colleges and research institutions, for undergraduate and post-graduate instruction.

The fuel to be used will be uranium oxide with a 20 per cent enrichment of uranium 235, hot, poisoned and with experimental absorbers, built up as 12 plates in a box of 3in by 3in by 24in, and weighing 4·5 kilograms. The fuel cladding is aluminium 0·020in thick. The moderator and the coolant are water and the reflector also of water with beryllia or graphite on the sides. The shielding will be water and barytes concrete, and the tank will be of aluminium.

The dimensions of the core will be 2ft 3in by 2ft 3in by 2ft; the reflector will be 3in or 6in thick on the sides and will have a minimum of 4ft of water top and bottom. The shielding will consist of 13in of water and 6ft 3in of barytes concrete on the sides and a minimum of 18ft 6in of water on the top. The overall dimensions will be 28ft high by 16ft 6in across the flats.

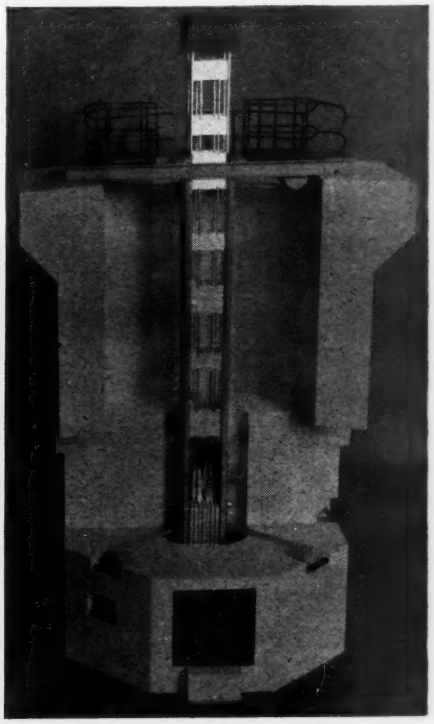
Physics (preliminary calculations, cold, unpoisoned)	
Resonance escape	0.96
Thermal utilisation	0.75
Diffusion length	1.65 cm.
Slowing down length	7.36 cm.
Laplacian	.0085 cm^{-2}.
$k\alpha$	1.50
Radiation fluxes (at 5 MW)	
Epithermal neutrons (max)	2×10^{14} n/cm^2/sec.
Thermal neutrons (max)	5×10^{13} n/cm^2/sec.
γ-radiation (edge of core)	2×10^{8} rad/hr.

The total thermal power of the reactor will normally be 1 MW with a maximum of 5 MW. When running at 1 MW the fuel consumption per day of operation amounts to 1 gram of U 235. The maximum fuel temperature will be 92 deg C, the maximum sheath temperature 90 deg C, the coolant inlet temperature 35 deg C and the coolant outlet temperature 45 deg C. Coolant will be pumped at the rate of 1,600 g.p.m. with a velocity in the core of 2·5 ft/sec. The pumping power required at 5 MW output amounts to 120 h.p. Two 1,000 g.p.m. pumps are to be provided and the coolant is treated by a filter and dimineralisation plant after use.

Cadmium sheet in aluminium containers is used for control, the fine control involving 0·5 per cent reactivity, the coarse control 8 per cent reactivity and the safety control 2×8 per cent reactivity.

The experimental facilities provided involve two core positions. The first has two graphite thermal columns 4ft 6in square by 7ft 4in long, one 12in diameter beam

Model showing a cross section of the "Merlin" reactor



Clearing the site for the reactor. The white buildings in the background house the research establishments' 4,000,000 V accelerator also used in nuclear experiments

hole, three 6in diameter beam holes, and a central hole in the core 3in by 3in. The second core position has two 6in diameter through tubes, four 6in diameter beam tubes, two 8in diameter vertical tubes, a central hole in the core 3in by 3in, and a shelf to take an object 2ft cube up to the core. The reactor is expected to be critical in 1957.

The basic nuclear physics research which started at Aldermaston Court nine years ago involves the use of two Van de Graaff accelerators which provide proton and deutron beams used to irradiate various light nuclei. By examining emitted particles and gamma-rays from the induced nuclear reactions, important data are obtained on the fundamental properties of the nuclei and the forces which bind them together. At present one of the accelerators, operating at 4,000,000 V, is being used to produce high speed hydrogen atoms for disintegration experiments.

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Portable Tools

I WOULD like to reply to the letter in your 10th February issue from Mr. D. M. Gill in connection with radio interference suppression for portable electric tools.

His letter implies that the manufacturers of portable electric tools have not tried either to avoid or effect a cure for interference. This is hardly true as the real root of the problem is that there are numerous restrictions as to the type of condensers which we are allowed to fit into hand-held equipment, which makes it impossible to design a practical unit.

An alternative is to use a plug top suppressor and there are a number of makes already on the market, of both the choke and condenser type, which are suitable for use with most 3-pin power points.

There is, of course, the alternative point of view that communication engineers are manufacturing radio and television sets which do not work satisfactorily under the conditions which exist in modern towns. One could say that it is time that they invented a system of reception which was efficient in that it selected the desired signal only instead of picking up unwanted signals.

Harmondsworth, Middx A. N. GREAVES,
Advertising Manager,
Black & Decker, Ltd.

Leeds' Unkindly Light

IN quoting the communication from "An Old Reader", who wrote to the *Review* on the 9th February, 1906, "Reflector" gave me, and no doubt many others, cause to smile. I do hope that "An Old Reader" is alive to-day and is therefore "An Even Older Reader" than he was. In fact my hope is that he is taking as long about dying as the gas lighting in Leeds streets has taken.

In Leeds gas lighting still is predominant and if memory serves me rightly the last published figures gave:—Gas lighting points, approximately 19,000; electricity, approximately 11,000.

The ring roads, made between the wars, are still illuminated by what were called "Hogarthian abortions" some little time ago. The present street lighting engineer must be faced with a colossal task both in the financial and physical aspects due to the absurd position which persisted in the city for so many years, where the manager of the Corporation gas undertaking was appointed also to the post of street lighting engineer and was thus given the opportunity of being his own best customer; and surely no one can blame him! Fortunately the city has at last seen the light and is converting to sodium as fast as circumstances permit.

Now that competition exists nationally the gas authorities tacitly admit their complete and utter inability to provide street lighting that is comparable in quality or quantity at anything approaching equivalent costs.

"An Old Reader" is to be complimented on his accurate prophecy as, "dying out fast" being a purely relative term, what is 50 years in the age of the universe?

"ANOTHER OLD READER."

Post Office Men Not Barred

My attention has been drawn to the comments made by you in your issue of the *Electrical Review* dated 27th January, and I hasten to assure you that there is no sinister motive whatever in the prohibition against serving members of the British Post Office applying through the medium of public advertisement. Members of the British Post Office, in fact, are invited in Post Office circulars to apply for appointments on secondment to the Postal Service of the Federation of Rhodesia and Nyasaland, and by this means enjoy terms far more favourable than those available for the applicant in private employment.

Through this secondment process the Post Office official is enabled to take a position in the Federal Postal Service and has three years to make up his mind whether he wishes to settle permanently in the Federation. If he decides that the country or the conditions of service are not all that he had hoped, he may return to the British service and resume his employment here. Should he elect to remain, he service is reckoned to date from the day that he left England.

To suggest therefore that there is discrimination against the Post Office employee is very far from the truth since he has his means of joining our service under conditions which give him the opportunity to try a new job whilst the old is still safeguarded for him.

London W.C.2. C. M. HONE,
Federal Public Service Attaché,
Rhodesia and Nyasaland.

"New Lamps for Old"

WHILST the general trend of Mr. G. V. McNeill's article in the *Electrical Review* of 10th February appears to reflect his company's unwilling efforts to recondition fluorescent tubes it is also obvious that his intentions are to belittle what has now become an accepted practice among industrial and commercial users of fluorescent lighting.

It should not be assumed that his light output curves reflect the performance of reconditioned tubes; in fact no firm undertaking this class of work could remain in business very long producing such results.

It is not true to state that the tube phosphors chemically deteriorate during the life of the tube. What happens is that mercuric particles settle on the coating and tend to

prevent intimate contact between the u.v. rays and the phosphor coating and so reduce light output. These mercuric particles are not difficult to remove during reconditioning and this is followed by a general clean-up of the tube interior. It occasionally happens that traces of nitrogen have been present during the tube's first life but since these amalgamate with the mercury in a manner beneficial to tube performance by forming a protective layer on the tube coating, these are not considered detrimental.

While it may serve Mr. McNeill's purpose to compare a repaired tube of 1953 origin with a tube from current production it must be remembered that present day phosphors are theoretically considered to have reached an efficiency of between 80 and 90 per cent so that any revolutionary improvement in the light output of new tubes is no longer possible, and for this reason the difference in light output between repaired and new tubes is becoming very slight. We estimate the light output of reconditioned tubes having the now largely used halophosphate coatings to be within 5 per cent of tubes from current production.

Quite a number of new tubes fail early in life due to air admission which is too minute to be detected at the manufacturing stage but yet will cause failure before the emissive qualities of the tube are exhausted. In the repairers' hands these tubes are rejected unless the defect is repairable and for this reason a higher percentage of repaired tubes may be depended upon to operate over a full life cycle. In addition to air leaks in new tubes it is known that the electrode assemblies and phosphor coatings continue to "outgas" when subjected to lower pressure since complete "outgassing" is not possible during manufacture and these harmful products which have been liberated during the first life of the tube are removed at the repair stage, thus enhancing the life of the repaired tube.

My firm has been engaged upon fluorescent tube repair for a number of years and the volume of work now reaching us has increased tenfold over the past five years. We have not yet been requested to offer a bonus with each tube repaired but have received quite a number of appreciative letters from customers some of whom report very considerable savings in annual lamp replacement costs. Incidentally the cost of repairing a 5ft 80 W lamp is 3s 11d and not 7s 6d as stated by Mr. McNeill and all repaired lamps are given the same guarantee as new ones.

It would be futile to comment upon Mr.McNeill's comparative table of lamp costs since this is based upon incorrect lumen output curves. He appears anxious to convey the impression that a repaired tube should not be expected to last more than 1,000 hours whereas we have tested these lamps on the "wrecker" and achieved the equivalent of 26,000 burning hours which includes over one million switching operations.

Middlesbrough.

R. C. JEFFERSON,
Technical Manager,
E. J. Dawes, Ltd.

[In a covering letter the writer says:—"Your readers will no doubt be interested to learn of our experiences as tube repairers and discriminate between what are probably two biased views on the same subject."—*Editors.*]

Restrictive Trade Practices Bill

BROADLY implementing the policy decisions already announced by the President of the Board of Trade, the Restrictive Trade Practices Bill published last week provides for the public registration, with a Registrar to be appointed by the Crown, of an extensive range of trade practices such as price rings, exclusive dealing and market sharing arrangements. Under the Bill it is proposed to establish a judicial tribunal with the same status and powers as the High Court to determine whether or not such practices are in the public interest, and machinery for prohibiting those which are considered not to be. Criteria are to be laid down upon which such an issue can be judged, with the onus of proof upon those who seek to justify the practices.

The collective enforcement of resale price maintenance will be prohibited and persons practising it will be liable to civil proceedings; thus stop lists and private trade courts maintained for this purpose will come to an end. Individual manufacturers of branded and other goods and other traders who fix retail prices will, however, be able to bring civil proceedings against traders who knowingly infringe resale price conditions, even if there is no contractual relationship.

The Registrar of Restrictive Trading Agreements, subject to the directions of the Board of Trade as to the order in which they will be taken, will take proceedings in respect of the agreements before the Restrictive Practices Court. There is a maximum penalty of £100 for failure to register a practice after notice has been given by the Registrar. Continued default after conviction carries a further fine of not more than £100 or not more than £10 a day for every day for which the default continues. In order to speed up the work of the Court, power is given to enable it to make a summary determination in respect of agreements which are considered to be governed by precedent established in previous cases.

To deal with matters inappropriate for reference to the new Court it is proposed to form a smaller Monopolies Commission. Membership will be reduced from 25 to 10 and the words "Restrictive Practices" will be omitted from the title. The Commission will continue to inquire into single-firm monopolies and into agreements relating wholly to exports where the persons concerned supply at least one-third of the total United Kingdom production of the goods involved. If a restrictive practice has been abandoned as a result of a report by the Commission before the new Bill comes into force, the industries concerned will only be able to reinstate it with the permission of the new Court, and not in any case until three years after the Bill has come into force.

Agreements relating exclusively to exports can be subject to registration at the same time as other agreements, but will be registered with the Board of Trade not with the Registrar. Such agreements will not be made available for public inspection and will not be submitted to the Restrictive Practices Court, but at the discretion of the Board of Trade they can be referred to the Monopolies Commission.

In an explanatory statement the Board of Trade said that the collective price enforcement would not be a criminal offence under the Bill, but persons practising it would be liable to civil proceedings. The proposals were in some respects a compromise between the majority and minority recommendations of the Monopolies Commission, but in the main they went considerably beyond both. The Bill would apply to all the known restrictive practices affecting the production, processing and supply of goods in the United Kingdom, including common prices and level tendering, and not just the six broad categories of restrictive practices examined by the Commission.

On behalf of the Federation of British Industries it was said that the Bill appeared to be based to a considerable extent on the principle that each case must be judged in the light of its own merits or defects, and to that extent it would get general support from industry. There would be resentment, however, that the procedure involved an industry facing the Court under the presumption that it was acting against the public interest unless it was proved to the contrary.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The London Electricity Board has appointed **Mr. E. J. Whitcher,** B.Sc.(Eng.), A.C.G.I., M.I.E.E., as deputy chief engineer as from 1st March next. Mr. Whitcher, who is at present chief technical officer to the Board, was educated at the City & Guilds Engineering College and received his training with the British Thomson-Houston Co., Ltd. From 1929 to 1934 he was with Merz & McLellan, and from 1934 to 1936 was senior technical assistant with the Westminster Electric Supply Corporation. In the last mentioned year he joined Central London Electricity, Ltd., as chief technical officer, a position which he held until nationalisation when he took up his present position with the London Electricity Board.

Mr. F. Rostron, M.B.E., M.I.E.E., export sales manager of Ferranti, Ltd., has been elected president of the Manchester Chamber of Commerce for 1956. Mr. Rostron joined the board of the Chamber in 1951 when he became chairman of the Engineering and Metals Section, and he became vice-president of the Chamber in May last year. He is chairman of the Manchester Branch of the Institute of Export and is a member of the B.E.A.M.A. Export Panel.

Mr. F. Rostron

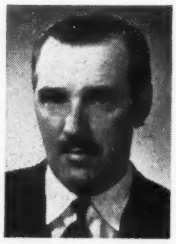
In recognition of their distinguished contributions to industry and the profession of engineering, the Council of the City and Guilds of London Institute has conferred the Fellowship of the Institute (F.C.G.I.), upon **Mr. E. W. Moss,** C.P.A., M.I.Mech.E., M.I.E.E., senior partner, Raworth, Moss & Cook, chartered patent agents, and **Mr. B. G. Robbins,** A.C.G.I., D.I.C., M.Sc.(Eng.), M.I.Mech.E., secretary of the Institution of Mechanical Engineers.

Mr. E. W. Jenkins has joined the British Central Electrical Co., Ltd., as chief accountant. He was with Bayer Products, Ltd., from 1945 to 1948, and has since been with the Vulcan Products, Ltd., as deputy chief accountant.

Mr. K. M. E. Mackay, M.B.E., has joined the board of Max Arc & Electrics, Ltd. **Mr. P. S. Jackson,** M.I.E.E., has been appointed chairman of the group and **Mr. J. R. Oliver,** A.M.I.E.E., managing director.

Mr. E. J. Davies (Wandsworth Electrical Manufacturing Co., Ltd.), and **Mr. P. E. Wheatland** (General Electric Co., Ltd.), have been re-elected chairman and vice-chairman respectively of the Association of Manufacturers of Electric Wiring Accessories.

Tufnol, Ltd., has opened a new branch office at Exchange Buildings, Quayside, Newcastle-on-Tyne, 1 (telephone: Newcastle 29693). From this office will be conducted the sales and technical service in the north-eastern area of England. **Mr. J. W. Woolley** has been appointed manager of the new office. He has represented the company in this area since June, 1949. He was educated at Kings' School, Worcester, and served in the Welch Regiment during the last war with the rank of captain. In 1946 Mr. Woolley joined the sales staff of Tufnol, Ltd., and represented the company in Lancashire and Yorkshire before taking over the north-eastern territory.

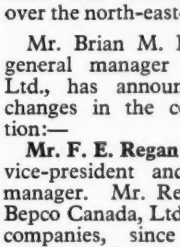


Mr. J. W. Woolley

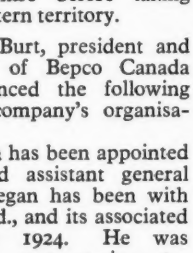
Mr. Brian M. Burt, president and general manager of Bepco Canada Ltd., has announced the following changes in the company's organisation:—

Mr. F. E. Regan has been appointed vice-president and assistant general manager. Mr. Regan has been with Bepco Canada, Ltd., and its associated companies, since 1924. He was appointed Ontario manager in 1934, became a director of the company in 1949 and vice-president in 1952. His new duties have necessitated a move from Toronto to the head office in Montreal.

Mr. D. J. Tamblyn has been appointed district sales manager at Toronto. He has been a senior sales engineer with Bepco for the past three years and, with the exception of six years military service, has been with Bepco Canada, Ltd., and associated companies, since 1936.



Mr. F. E. Regan



Mr. D. J. Tamblyn

Mr. N. L. Calhaem, M.A., A.M.I.E.E., formerly lecturer at the University College of North Wales, has been appointed as lecturer in electrical engineering at the Brighton Technical College.

Mr. C. O. Boyse, B.Sc.(Eng.), M.I.C.E., M.I.E.E., has been appointed a director of British Insulated Callender's Cables, Ltd.

At a recent dinner for formen and senior staff of **Crompton Parkinson, Ltd.,** held at the Chelmsford Works Social Centre, gold hunter watches were presented to eight men who had completed forty years' service with the company, and gold wrist-watches were presented to fourteen who had completed twenty-five years' service.

The **Scientific Instrument Manufacturers' Association** will hold its annual dinner-dance at the Dorchester Hotel, London, on 13th April. The principal guest will be Sir Owen Wansbrough-Jones, K.B.E., C.B., M.A., Ph.D., chief scientist of the Ministry of Supply.

Mr. Michael S. Grew has been appointed sales manager to Electrix, Ltd., domestic equipment manufacturers, of Sterling Works, Dagenham, Essex. The post of sales manager is a new one with the company. Mr. Grew, who has spent the whole of his sales career in the vacuum cleaner trade, is 41 years of age; he served with R.E.M.E. during the war.

Mr. M. S. Grew

Mr. A. F. Lampitt, who as we mentioned in our report last week of the annual dinner-dance of Southern United Telephone Cables, Ltd., has been elected a director of the company, has been general manager and secretary since 1944 and has been responsible for the post-war development of the company. Mr. Lampitt is a chartered accountant who, after early training in Bristol and Liverpool, was for eight years with Deloitte, Plender, Griffiths & Co. on special work in connection with the cable industry, and later for the London Transport Board. He was previously, from its formation, secretary and accountant of Aberdare Cables, Ltd., and South Wales Switchgear, Ltd. In 1955 he

was chairman of the Telephone Cable Makers' Association.

Mr. B. Blair and **Mr. A. A. Chinnery** have been appointed executive directors of the Plessey Co., Ltd. Mr. Blair joined the company in 1938 as works engineer, and he has been

Mr. B. Blair

Mr. A. A. Chinnery

responsible for the development of existing plants and the construction and equipment of all new factories. He was also responsible for the equipping of the underground factory which was situated in a non-operating extension of the Central Line of the London Underground Railways during the war. Mr. Chinnery joined the company as a progress chaser in 1940 and became manager of the Equipment Division in 1950.

Mr. John Wallace, B.Sc., A.M.I.E.E., senior assistant engineer (system planning) at the Kendal headquarters, No. 6 (Lakeland) Sub-Area of the North Western Electricity Board, has been appointed sub-area engineer in succession to the late Mr. L. B. Marshall. Mr. Wallace, who was educated at Manchester University, had experience with the British Thomson-Houston Co., Ltd., for seven years before joining the Barrow Corporation Electricity Department in 1934 as shift engineer-in-charge at Buccleuch Street generating station. In 1945 he became an assistant mains engineer and on nationalisation continued in this position at headquarters, No. 6 Sub-Area, for a short time and then specialised on mains planning and construction. He was promoted senior assistant engineer (system planning) in 1949.

Mr. A. Hammond has been elected to the board of the Ensel Electric Co., Ltd. Apart from active service during the war, he has, since 1937, occupied the position of works manager at the company's Kingsbury factory.

Mr. A. Hammond

Parnall (Yate), Ltd., has appointed **Mr. A. E. Brunton** as sales representative for North-East England. He succeeds **Mr. A. D. Dunn,** who has left the company to manage his own business.

There was a record attendance of over 650 at last Friday's annual luncheon of the **Electrical Trades Commercial Travellers' Association** over which Mr. G. Candelatt (chairman) presided. As is customary, the first speech was an appeal for the Association's charities which was made by Mr. S. Johnson, who has been charity steward for the past 25 years. He mentioned that the Association had contributed in the past year 300 guineas to the Electrical Industries Benevolent Association and 50 guineas to the Royal Commercial Travellers' Schools. These sums had been added to by Mr. B. G. E. Barrie, who had personally contributed 50 guineas to the E.I.B.A. and 25 guineas to the Schools.

The toast of the Association was made by Mr. Sidney Lipton, the well-known band leader, who referred to the rapid advance made in electrical techniques.

Mr. R. G. Brandon (president), in reply, said that he was one of the Association's earliest members and was vice-president in 1932. He was the first president to have "risen from the ranks" and he was still a salesman at heart. He referred with pleasure to the presence of Mr. A. R. Frost, of the Midland Branch of the Association, and of Mr. R. H. Corlett, of the North-Western Branch. The Association was endeavouring to form a branch in South Wales and it hoped to hold the inaugural meeting in April next. He asked that greater efforts should be made to increase the membership of the Association. He paid tribute to the help which it had received from the General Electric Co., Ltd., and he hoped that executives of other large companies would take a greater interest in the Association.

The toast of the guests was proposed by Mr. Candelatt and Mr. O. Pawsey responded. A collection made during the luncheon for the Association's charities raised the sum of £165.

At the Electrical Trades Commercial Travellers' Association luncheon (left to right): Messrs. O. Pawsey, G. Candelatt, R. G. Brandon and Sidney Lipton

Mr. J. Bentham, district senior clerk, Bolton 2B District, North Western Electricity Board, retired on 16th February after forty-nine years' service. He started as a junior clerk with the Bolton Corporation Electricity Department and at vesting day he held the position of commercial assistant to the engineer and manager. At a ceremony in the Demonstration Theatre at the Bolton Service Centre on 15th February, Mr. E. G. Wardle, A.M.I.E.E., sub-area manager, presented Mr. Bentham with a gift of silver and a travelling case on behalf of all his colleagues and with a certificate commemorating his service and a canteen of cutlery on behalf of the Board.

The **Norfolk Electrical Social Committee** is holding a dinner-dance on 7th March at the Lido Ballroom, Aylsham Road, Norwich. Tickets (£1 10s each) can be obtained from Mr. H. A. Greenfield, "Gambia," Christchurch Road, Norwich.

Mr. H. R. Walton, B.Sc., sales manager of the Fisher Governor Co., Ltd., has been appointed a director.

Mr. A. C. Hall, M.S.M.A., has joined Oliver Pell Control, Ltd., as manager of the Sales Department. Mr. Hall was previously, until 1952, divisional manager, home sales, with H. Fisher (Oldham), Ltd.

Mr. A. C. Hall

Mr. J. K. Lord, Associate I.E.E., A. M. I. Loco. E., rolling stock engineer, Manchester, London Road, with British Railways, has been appointed as electric traction engineer (Eastern Region), Manchester.

The annual dinner and dance of **Davis & Timmins, Ltd.,** was held on 10th February at the Savoy Hotel, London, over 250 customers and their ladies being present. Speeches were made by Mr. W. G. Somerville and Mr. H. H. S. Hillier, directors, and responses were made by Mr. T. F. Turner, purchasing manager, English Electric Co., Ltd., and Miss Sylvia Peters.

OBITUARY

Mr. Walter F. Knight, chief executive of the Electrical Division of the Expanded Metal Co., Ltd., and chairman of William Steward & Co., Ltd., died at sea on 15th February at the age of sixty-two. Mr. Knight was returning from a business trip to South Africa. He was buried at sea. Only last month he was elected to the board of the Cressall Manufacturing Co., Ltd., following the acquisition of

that company by the Expanded Metal Co. Mr. Knight was well known in the electrical industry, particularly in connection with his wide experience of industrial and traction resistors and heaters. He joined the Expanded Metal Co. in 1944 and had been chief executive of the Electrical Division since May, 1947. He leaves a widow and daughter.

Mr. G. Bowerbank.—The death occurred on 13th February at the age of forty-six of Mr. Geoffrey Bowerbank, B.Sc., M.I.E.E., A.M.I.Mech.E., superintendent of production services in the Admiralty. Mr. Bowerbank joined the Admiralty in 1937 as an assistant electrical engineer. Before that he had served a graduate apprenticeship with C. A. Parsons & Co., Ltd., graduating from Armstrong College, Durham University, in 1932. After post-graduate training he became a technical assistant in the Construction and Power Departments of the North-Eastern Electric Supply Co., Ltd., and in 1935 joined the London Passenger Transport Board as an assistant engineer. From 1937 onwards he served with the Electrical Engineering Department at the Royal Naval Dockyards, Portsmouth and Chatham, and between 1942 and 1945 as an electrical engineer at the Royal Naval Base, Kilindini, East Africa. Subsequently he was with Dockyard and Electrical Engineering Departments at Bath as a superintending electrical engineer until 1949. In that year an Admiralty Production Pool was formed and Mr. Bowerbank was appointed as its superintendent, under the deputy controller (production). When this latter post lapsed in 1951 Mr. Bowerbank became the superintendent of production services.

Mr. Alfred Wilson Clegg, M.I.E.E., a former borough electrical engineer of Accrington, died on 11th February at the age of seventy-seven. Mr. Clegg was with the Accrington Corporation for over forty years and resigned in 1941 on account of that authority's decision not to adopt the salary scale of the National Joint Committee.

Mr. Alfred George Fox, A.M.I.E.E., Wh.Ex., died on 13th February at the age of seventy-seven.

Mr. H. E. Morrow.—The death occurred on 14th February at the age of seventy-eight, of Mr. Harold Ernest Morrow, A.M.I.E.E., Capt. R.E. (Retd.).

Mr. J. J. McKenna, joint managing director of the Backer Electric Co., Ltd., since 1951, died on 11th February. He had been connected with the electrical industry for nearly fifty years. Mr. McKenna was educated at Faraday House and served in his younger days as a power station engineer in Lancashire and Birmingham. In the 1914-18 war he served with the Royal Warwickshire Regiment and the Royal Flying Corps. Returning to civil life, he took up a position with the Brompton Electricity Supply Co. and later worked for the Metropolitan-Vickers Electrical Co., Ltd., Domestic Electrification, Ltd., and the English Electric Co., Ltd. He joined the Backer Electric Co., Ltd., Rotherham, in 1946 and was appointed to the board in the following year. Mr. McKenna leaves a widow and one son.

Nuclear Power Agreement

Mitchell Engineering, Ltd., of Peterborough, and A.M.F. Atomics, Inc., New York (a subsidiary of the American Machine & Foundry Co.), have completed plans jointly to design and construct nuclear power plants in the Commonwealth and other countries. In making this announcement at a Press conference in London last week, Mr. F. G. Mitchell, chairman of Mitchell Engineering, said that this was the first agreement of its type in the atomic energy field and the first practical expression of the United Kingdom and United States policy of encouraging the peaceful applications of atomic energy at home and abroad. The agreement falls within the scope of the arrangements permitted by the United Kingdom Atomic Energy Authority and the United States Atomic Energy Commission for collaboration between firms in the two countries. The progress in nuclear power applications made by the two countries had made it feasible for practical and economic power plants to be supplied to those parts of the world where the cost of power generated by nuclear fission would be less than the cost of power now obtained by using fossil fuel.

Mr. Mitchell said that their experience in the design and construction of civil engineering works and thermal power stations in various parts of the world, together with the recent work they had undertaken for the Atomic Energy Commission in Scotland, had prepared them for this extension of their interests to the development of nuclear energy throughout the world. A.M.F. Atomics, Inc., would design and supply the reactors and their components, thus enabling Mitchells to be fully organised to supply atomic power plants wherever they were needed. He thought the type of reactor that had been developed would be of particular use to the South African market as it would overcome the problems of hauling coal and oil over long distances. Two of the biggest mining corporations were investigating the project, probably for use in remote areas. Special consideration had been given in the design to the problems of operation by engineers rather than scientists. This had been achieved and, after twelve weeks' training in the United States, a trained engineer would be fully competent to operate the plant at all times with a specially trained team from the two companies paying periodic visits to replace the fuel.

Chancellor's Statement

In the House of Commons on Friday the Chancellor of the Exchequer (Mr. Harold Macmillan) announced further measures against inflation, including additional cuts in the capital expenditure of nationalised industries. He said that these industries had already co-operated by reducing their programmes for 1956 before submitting them to the appropriate Ministers, and they had now reduced them further by just under £50 million. In the result the total capital requirements of the fuel and power industries should be some £20 million less than in 1955. On the other hand the British Transport Commission, although it had agreed to substantial reductions, must spend more than in 1955 in order to make a start on its modernisation plan. The contributions of the various authorities included £13,750,000 by the Central Electricity Authority and the two Scottish Boards and £5,000,000 by the Gas Council and Area Boards.

It was further proposed that hire-purchase deposits for consumer goods should be increased from 15 and 33⅓ per cent to 20 and 50 per cent, respectively, with a new restriction on rental agreements and the extension of control to the hire-purchase of some capital goods.

The Chancellor also announced the immediate suspension of industrial investment allowances for capital expenditure and the restoration of initial allowances.

Canadian Steam Station

A 240 MW steam power station is to be built by the Saskatchewan Power Corporation at Estevan, in the lignite area of Southern Saskatchewan. The plant will use cooling water from a dam across the Souris River, subject to the consent of the International Joint Commission. Ewbank & Partners (Canada), Ltd., wholly-owned subsidiary of the British firm of consulting engineers, have been appointed consultants for the first phase of this project, estimated to cost $14 million; the whole scheme will cost some $40 million.

Financial Section

STOCKS and SHARES

AFTER falling into a state approaching demoralisation, over the failure of the overseas trade returns to show any significant response to treatment, Stock Exchange markets have since been mainly under the influence of Government decisions (or the expectation of them) on further action to stay the deterioration. From any normal point of view, the electrical equipment market could have found much for satisfaction in the company news, which included the two main events of the season in the shape of the preliminary results of A.E.I. and English Electric, both of which made their appearance a day or two before the announcement of the increase in Bank Rate from 4½ to 5½ per cent. When the dust of this month's disturbance has settled, these results will no doubt come in for the favourable recognition due to them.

Bank Rate Effects

Meanwhile, Stock Exchange prices have been severely shaken by the Bank's decision. A sharp upward reaction followed the slump, but investment confidence has received a rough shake, and general reassessment of values followed as a natural corollary to the adjustment of British Government securities to the advance in Bank Rate.

A.E.I.

Market reactions to the final dividend declaration and preliminary profits statement from Associated Electrical Industries were blanketed by the heavy depression over the whole industrial market at the time, and by the advance notice of the big "rights" issue of shares. In normal circumstances, the market could scarcely have reflected anything but satisfaction with the excellent figures and the 1 per cent increase in the ordinary dividend. The latter is being brought up to a total of 15 per cent on capital increased to £25 million during a year which covered the absorption of Siemens and Australian General Electric, plus a substantial cash issue. With group profits up from £11·7 to £13·2 million (subject to tax of £7·4 million, and after a special depreciation charge of nearly £2 million) the year's surplus represents earnings of over 50 per cent on the ordinary capital ranking, so that the new rate of dividend is covered three and a half times, a margin which gives support to the directors' forecast of its maintenance after the coming increase in capital.

Capital Issue

Allotment letters are expected to go out to A.E.I. stockholders early next month in connection with the offer of one new share at 57s 6d for every three held. Payment of 20s per share will be due on 23rd March, with a second instalment of the same amount by 15th June and the remaining 17s 6d by 15th August. The new shares will not be entitled to the final dividend just declared, or to the first two quarterly interims on account of this year. More than £23¾ million is being raised by the issue, a part of which is being offered to employees. Proceeds are to be used mainly in adding to production capacity, which the board think will be inadequate on the basis of their opinion that the next decade will see at least a doubling of the demand for electrical equipment. They tell stockholders that last year's production broke all records, and that there were firm orders amounting to £144 million on the books at the end of the year.

English Electric Results

English Electric's decision to hold the dividend for 1955 at a total of 12½ per cent, the same rate as before, fell short of some expectations, although the distributions apply to capital increased since 1954 from £10·6 to £15·2 million now. This increase was the result of the issue of shares against the acquisition of Vulcan Foundry and Robert Stephenson, and the "rights" issue of shares in October. In terms of money, the amount going to ordinary stockholders rises from £730,000 to just over a million, whereas the net surplus available has expanded from approximately £2·1 to £2·7 million. It is pointed out in the company's preliminary statement that the latest figures are not in all respects comparable with those of last year, since they include, for the first time, the results of the two above mentioned acquisitions. The yield shown by English Electric shares has lately gone up to nearly 5 per cent.

T.C. & M. Loan Stock

In early dealings, the new 5¾ per cent unsecured loan stock issued by Telegraph Construction & Maintenance held a premium of between 1 and 2 points on the price of 98 at which it was placed. It became fully paid yesterday, 23rd February, and will be transferable free of stamp for a further month. By this issue the company are raising the best part of a million new money, to be used in developing their own business and that of the associated Submarine Cables company. The stock is redeemable finally at 100 in 1976, or earlier, in whole or part, after 1974. Particulars of the issue showed the annual interest charge to be covered more than seven times over by the average of the group profits for the five years up to 1954, and the principal amount some six and a half times by the net assets of the group. Profits in 1955 are estimated to have exceeded the previous five-year average.

International Combustion

In the case of International Combustion (Holdings), the preliminary statement on results for the year ended last September were good enough to make the 5s ordinary shares at least strongly resistant to surrounding influences. Just after the news the price did in fact harden a little to the neighbourhood of 17s. With the total dividend for the year raised from the equivalent of 16⅔ to 20 per cent, the yield improved to about 6 per cent. Trading profit has expanded by 10 per cent to £1·8 million, from which taxation takes £961,000 and the ordinary dividend £331,000, the latter thus being covered two and a half times by the net surplus.

Broadcast Relay Issue

In giving shareholders the details of their new capital issue, Broadcast Relay Service provided information of general interest in connection with the company's commercial television investments. The latter are represented by an interest of approximately one quarter in Associated-Rediffusion. It was expected that this venture would not begin to become profitable until the fourth year. Associated-Rediffusion have, in fact, incurred substantial losses to date, but Broadcast Relay retain confidence in the long-term prospects of the investment, which is likely to amount to £950,000 by the end of March, and it is not therefore their intention to provide against the current losses. Only a part of the new capital issue is required in this connection. The greater part of the business remains concerned with the group's rediffusion services at home and abroad, as well as with manufacturing activities, which continue to be developed.

Dividend Prospects

The Broadcast Relay Service issue involves the offer of just under two million new 5s ordinary shares to existing shareholders at a price of 14s, and will thus raise some £1·3 million new money. In early dealings the new shares commanded a premium of about 2s, part of which was lost in the general fall of prices elsewhere. On the subject of prospects, the company's circular expected profits for the year ending next month to be at least up to the previous level, and indicated a total dividend of 12½ per cent, tax-free, on capital doubled by last year's scrip issue. An interim of 5 per cent has already been paid, and the new shares will not participate in dividends until after the final for 1955-6. At an all-in price of 15s (free of stamp) they were showing a yield equivalent to rather more than 7 per cent gross on the rate of dividend indicated.

REPORTS and DIVIDENDS

Associated Electrical Industries, Ltd.—The preliminary unaudited statement for the year ended 31st December last shows a trading profit of £13,238,000, as compared with £11,736,540 for 1954. After meeting all charges, including £1,912,000 for depreciation, £1,998,000 set aside for increased replacement cost of fixed assets, and £7,362,000 for taxation, the net profit is £5,876,000 (against £4,512,589), to which is added £415,000 set aside for taxation and no longer required, making £6,291,000. The amount retained by subsidiaries is £2,995,000 and the balance available for appropriation by A.E.I. is £3,166,000, to which is added £707,000 brought in. General reserve receives £1,000,000 and it is proposed to pay a final ordinary dividend of 7½ per cent. Three ordinary interim dividends have been paid—first of 2½ per cent on £19·83 million and the other two of 2½ per cent on the existing £25 million ordinary capital. With the final distribution, the total dividend for the year is 15 per cent (against 14 per cent), and the aggregate payment is £2,081,896 (£1,336,073). The balance carried forward is £689,000.

The terms of the rights issue of ordinary shares were announced last week. It is proposed to increase the capital to £45,000,000 by the creation of 8,500,000 ordinary shares of £1 each and 1,500,000 unclassified shares of £1 each. The unclassified shares, together with 5,900,000 unclassified shares at present authorised but unissued, are not required at present, and will provide for future issues, if and when these are considered desirable. Ordinary stockholders will be offered 8,333,333 ordinary shares at 57s 6d per share in the proportion of one new share for every £3 of ordinary stock held. The shares offered will not rank for any dividend in respect of the year ended 31st December last, nor for the first two quarterly interim dividends in respect of the year 1956, but will otherwise rank *pari passu* with the existing ordinary stock. A further 166,667 ordinary shares will be offered to employees at 57s 6d per share. The net proceeds of the issue of 8,500,000 shares will provide approximately £23,800,000 to finance the company's business. The sum raised will in the main be spent on additions to the existing installations, on a number of new factories, and on ancillary projects, including the expansion of the training and educational establishments. The circular to stockholders states that at 31st December last uncompleted firm orders on the books amounted to £144 million.

International Combustion (Holdings), Ltd., report group profits for the year ended 30th September last of £1,786,939, as compared with £1,624,924 for 1953-54, and after providing £960,975 for taxation, the net balance is £825,964 (against £629,378). General reserve receives £250,000 and development and research £150,000. It is proposed to pay a final ordinary dividend of 12½ per cent, making 20 per cent for the year on capital increased by a 50 per cent scrip issue. For the previous year the distribution was 25 per cent on the smaller capital.

The English Electric Co., Ltd.—The preliminary statement for the year ended 31st December last shows a group profit of £6,570,601, as compared with £5,371,281 for the preceding year. Taxation absorbs £3,471,954 and £242,015 is transferred to capital reserve (taxation relief on investment allowance on capital expenditure). The net balance attributable to the English Electric Co. is £2,753,302 (against £2,098,609). It is proposed to pay a final ordinary dividend of 8½ per cent on £15,221,721 capital, making with the 4 per cent interim payment on £11,416,291 capital, a total of 12½ per cent for the year. For the previous year similar payments were made on £10,616,193 capital.

Marconi's Wireless Telegraph Co., Ltd., reports a group profit for 1955 of £907,122, as compared with £950,255 for 1954, and after providing £438,708 for taxation, placing £12,800 to capital reserve (tax relief on capital expenditure) and adding £30,000 tax unrequired, the net profit is £485,614 (against £420,373). General reserve receives £325,000, and the dividend for the year is unchanged at 10 per cent.

The Marconi International Marine Communication Co., Ltd.—The group profit for 1955 is £419,185, as compared with £334,065 for the previous year. Taxation requires £155,042 and capital reserve receives £89,500 (tax relief on capital expenditure). The net balance is £174,643 (£141,117). A sum of £100,000 is placed to general reserve and it is proposed to pay a final dividend of 6 per cent, making 10 per cent for the year. The distribution for the previous year was the same, but the interim dividend was paid on smaller capital.

The General Cable Manufacturing Co., Ltd.—In the course of his speech at the recent annual meeting, Mr. C. W. R. Pantlin (chairman), referred to the unprecedented level of copper prices and the increase in rubber prices. He said that the reduction of the net profit in comparison with the previous year was disappointing in view of the fact that the volume of the parent company's trade was more than maintained during the year, and in fact, the sterling value of sales was a record. In the rubber cable trade they had to contend with a copper price which, apart from some erratic interludes, jumped in leaps and bounds from £240 to £400 per ton, and a rubber price which increased by over 100 per cent during the same period. This handicap, which took considerable toll of the year's profits, had operated to some extent since the close of the year, and it was evident that they could not expect any early relief from the disturbed and unusual conditions which the combination of inflated material prices and underlying uncertainties had brought in their wake. The board had had in mind for some time that the rubber cable trade was vulnerable to major disturbances outside its control, and these considerations weighed heavily in favour of the decision to acquire the Britannic Cable Co. a year ago and thereby extend the company's interests into the paper insulated power cable section of the industry, which had always experienced relatively greater stability by virtue of its more direct association with electric power development and the more rational basis on which its product was sold in terms of manufacturing costs. Even the paper cable trade, however, was at present encountering exceptional difficulties owing to the unprecedented level to which the price of copper had risen. The cost of copper had produced new technical problems owing to the fact that the electricity authorities were having to consider the substitution of aluminium for copper as a cheaper alternative.

George Cohen, Sons & Co., Ltd., are maintaining their interim ordinary dividend at 3½ per cent on capital increased by a two-for-three scrip issue. It is stated that the increased payment is made to reduce the wide disparity between the interim and final payments.

Crabtree Electrical Industries, Ltd., has declared an interim dividend of 7½ per cent (unchanged).

Bankruptcies

J. W. Luker and **H. A. R. Phillips**, lately carrying on business in partnership at East Street, Lewes, Sussex, and at 206, High Street, Lewes, under the style of Gordon & Luker, electrical contractors.—Third and final dividend of 2s 6d in the £, payable at the offices of A.E. Orbell & Co., 7, Old Steine, Brighton, 1.

R. A. Norman, 5, Bright Street, Middlesbrough, formerly of 31, City Road, Middlesbrough, and carrying on business as an electrical retailer and contractor at 25, Cleveland Street, Middlesbrough.—Public examination 9th April at the Court House, Wilson Street West, Middlesbrough.

Liquidation

E.C.C. (Telecommander), Ltd., electronic component manufacturers.—Winding up voluntarily. Liquidator, Mr. E. S. Smith, 5, Great Winchester Street, London, E.C.2, appointed 8th February. Particulars of claims to the liquidator by 2nd March.

VIEWS on the NEWS

By REFLECTOR

THE further drastic cuts in capital expenditure announced by the Chancellor of the Exchequer last week fall with great severity on the nationalised industries and will mean the deferment of many much-needed improvements. The programme of the British Transport Commission for this year is to be scaled down by £22 million, but I am glad that despite this substantial reduction the Commission is able to go ahead with its major plan for re-equipping and speeding up the railways. In a statement last week-end the Commission said that capital investment by British Railways this year would be £12 million less than planned, but "this will not affect the major development plan." One of the chief factors leading to our present troubles has been the need to import large quantities of coal and virtually abandon exports; only by rigorous fuel economy, to which railway electrification will make an important contribution, can we look forward with any confidence to an easing of these difficulties.

* * *

I have had a letter from Mr. E. W. Ashby, of Liverpool, commenting on the note on friendly rivalry between electrical and mechanical engineers in my 3rd February page. He says that this friendly rivalry is often in evidence in the Liverpool Engineering Society and he also mentions a speech made at an I.E.E. dinner seven or eight years ago by Professor G. E. Scholes in which he quoted a brother professor as defining an electrical engineer as "a mechanical engineer who has had his brains removed." It is a testimony to the friendliness between the two branches of the profession (if they are really two branches) that no "electrical" was offended.

* * *

A strange-looking illustration on the back page of the *Fens Review* (Eastern Electricity Board) turned out to be the top of a street lamp standard—inverted. A note headed "Street Lighting as an Aid to Air Navigation?" says that recently the pilot of an R.A.F. plane in difficulties had to make a crash landing and came down in the middle of a village. He pointed out that if there had been street lamps he would have seen them and been able to take evasive action. "Should the R.A.F. contribute to the cost of street lighting?" queries the correspondent.

* * *

Where electricity tariffs are concerned I'm afraid most of us are guilty of reasoning from the particular to the general. A recent example was a letter in the *Manchester Evening News* from a correspondent signing himself "Disgusted." Criticising the new standard domestic tariff, he suggested that instead there should be a flat rate of 3d a unit. I have some sympathy with the idea of a single rate, as most primary charge components have a somewhat arbitrary basis and certainly are a source of trouble to the Boards, but the majority of consumers would have cause to echo this consumer's nom-de-plume if the tariff he proposes were introduced. One consumer, with a consumption in the past quarter of 1,040 units—comparatively modest these days—pointed out that his bill of £4 8s 2d would thereby have been increased to no less than £13.

* * *

The Kingston by-pass, an arterial route much of which traverses residential areas, has one of the worst accident rates of any road in the London area. Among a number of measures which were proposed by the Surbiton Borough Council in the interests of greater safety was a plan for lighting that part of the thoroughfare in its area at a cost of £22,000. I am sorry to read, however, that the Council has now decided to defer the scheme on grounds of economy. In the course of the debate one alderman, according to the *Surrey Comet*, urged the Council

> "to remember that the by-pass was not the council's road: those who put it there should pay for the lighting, which might not make any difference at all. It was most inopportune for the council to consider such expenditure at present. The people who were injured or killed on the by-pass were strangers and not local people."

This, surely, is parochialism carried to the extreme.

* * *

The *Sunday Dispatch* recently published "A Pictorial History of Railways" (price 2s) which covers in an interesting way the development of rail transport since the early part of last century, mainly in this country but also overseas. Naturally it deals largely with steam locomotives but a fair amount of attention is paid to electric traction. It is said that the only example of main-line electrification is the Manchester-Sheffield system inaugurated in 1954. This is true only with the qualification "locomotive-operated." After all electric multiple-unit trains have been running from London as far as Portsmouth and Brighton for some years now and that is something more than suburban electrification.

* * *

In view of the current discussions upon trade with China I found the following sixty-year-old note of some interest. It comes from the *Electrical Review* of 21st February, 1896:—

> "We understand that a commercial mission, consisting of seven persons, is to proceed to China shortly for the purpose of inquiring into the present conditions of trade between England and that empire with a view to opening up new fields for British commerce. The Blackburn Chamber of Commerce set the ball rolling, and the necessary expenses of the expedition are being subscribed privately, Mr. Yerburgh, M.P., having undertaken to contribute one-third, if the remainder is forthcoming within six weeks. The progress of this mission should be closely watched by electrical manufacturers at home, for sooner or later a vast field will undoubtedly be opened up in China for electrical work, and one effect of this mission may be to hasten that period."

INDUSTRIAL NEWS

Domestic Water Heater Manufacturers

At the request of various leading manufacturers of domestic electric water heaters the B.E.A.M.A. has re-instituted its Water Heating Section. The inaugural meeting of the Section was held on 14th February at the Connaught Rooms, London, when Mr. F. L. Humber (Ferranti, Ltd.) was elected chairman and Mr. K. Taylor (Santon, Ltd.) vice-chairman. The secretary of the Section is Mr. T. Counter.

On the same day the first meeting of a new Association—Associated Manufacturers of Domestic Electric Water Heaters, with the short title of A.M.D.E.W.H.—was held at the Connaught Rooms. The chairman for the 1956-57 session is Mr. F. L. Humber and the vice-chairman is Mr. K. Taylor. The secretary is Mr. T. Counter and the offices are at Kingsway House, 103, Kingsway, London, W.C.2. (telephone: Holborn 4608).

Isotope Company's Reorganisation

Isotope Developments, Ltd., has announced a capital reorganisation designed to expand its activities throughout the nucleonic field both at home and overseas. Associated Electrical Industries, Ltd., has joined the existing shareholders of the company, and taken part in the new capital scheme. The announcement was made by the new chairman of the company, Mr. W. W. H. Hill-Wood, who succeeds Mr. R. D. Peters, who has now resigned. Mr. H. A. Luss, previously a director, and Mr. G. F. Thick, previously director and general manager, have been appointed as joint managing directors of Isotope Developments, Ltd.

New Plessey Factory

In step with plans to develop light industries in the Portsmouth area, the Plessey Co., Ltd., has just opened a new factory at Havant. All Plessey switch production will gradually be transferred to Havant and, as this takes place, new design features will be incorporated into existing types. The plant, which is at Leigh Park Estate, Havant, Hants, is expected to provide employment eventually for at least 1,000 people.

Cable for Colombo

British Insulated Callender's Cables Ltd., announces the award of a £365,000 contract from the Ministry of Transport and Works of the Government of Ceylon. The contract is for the supply and installation of 55 miles of 33 kV, 11 kV and auxiliary pilot cables. The 33 kV cable with associated pilots will feed various substations from the receiving station at Kolonnawa, Colombo, whilst the 11 kV cable will reinforce and extend the existing system to meet present and future loads. The contract calls for 26¼ miles of 3-core, 0·3 sq in, 33 kV solid screened type cable, lead-alloy sheathed, steel tape armoured and served overall, together with six miles of 11 kV belted type cable, and 22¾ miles of lead-sheathed pilot cable.

The first section, comprising 7·4 miles of 33 kV and 3·7 miles of pilot cable, is due to be completed by August of this year.

Tube Investments Acquisition

Tube Investments, Ltd., has acquired from the Iron and Steel Holding and Realisation Agency the whole of the issued capital of the Park Gate Iron & Steel Co., Ltd., of Rotherham. The price is £5,600,000 of which £1,000,000 was paid on completion and the balance of £4,600,000 will be paid within two years. It is intended that the Park Gate Co. shall continue and expand the production of high quality steels. The acquisition also makes it possible to co-ordinate its development with that of the Round Oak Steel Works, acquired by Tube Investments in 1953, with a view to increasing supplies generally and to alleviating in particular the continuing shortage of steel for seamless tube manufacture.

Moulding Machine Agreement

Foundry Equipments, Ltd., of Leighton Buzzard, and British Insulated Callender's Cables, Ltd., announce that arrangements have been concluded whereby Foundry Equipments, Ltd., will take over the manufacture, sale and servicing of all magnetic moulding machines hitherto manufactured by British Insulated Callender's Cables, Ltd., as from 1st March. All inquiries should be sent direct to Foundry Equipments, Ltd., as from that date.

Saudi Arabian Market for Accessories

A report has been prepared by the Commercial Department of the British Embassy at Jedda on the market for electrical wires and cables, wiring accessories, and domestic electrical appliances in Saudi Arabia. This states that the remarkable building boom which has been going on in the main towns of Saudi Arabia since 1950 and seems likely to continue for several years to come has meant the creation of a considerable demand for electric wires, cables and fittings for domestic wiring purposes. The market for fluorescent lighting and electric lamps is growing in particular. As town power supplies improve a fair demand is also growing for domestic electric appliances, especially for refrigerators. For the future United Kingdom manufacturers should keep an attentive eye on the development of this market, bearing in mind that voltages vary from town to town. There is strong competition from the Continent, notably from Holland and Belgium, with extremely low quotations for wires and cables. In the domestic electrical field both American and German products are well established. Some United Kingdom makes are known but in general the effort made by United Kingdom manufacturers in the domestic field has not been remarkable. So long as prices are competitive, however, and deliveries efficient, there is no reason why the United Kingdom should not take a greater share of this market.

Supplies for the L.C.C.

From the London County Council, County Hall, S.E.1, we have received a 19-page booklet, "The Supply Services of the London County Council," by Mr. T. J. Jones, O.B.E., chief officer of supplies. This is a short account of the organisation and activities of the Council's Supply Department and it shows the extraordinarily wide range of commodities and equipment which the Council purchases in the carrying out of its manifold functions. For instance, under the heading "General Stores" there are included electrical and scientific apparatus and electric lamps. Among the things purchased for the Council's housing estates (to the extent of £700,000 a year) are electric wash boilers, washing machines and drying cabinets as well as kitchen equipment which, presumably, would include cookers.

A section of special interest to suppliers or would-be suppliers of goods to the Council is that headed "How We Buy". This describes the method of calling for tenders from firms on "prescribed lists" of which there are 600 embracing 13,000 firms in all.

Protection Against Radiation

A short course on the elements of radiological protection (i.e. personal safeguards against radiation) will be held at the Isotope School, Atomic Energy Research Establishment, Harwell from 9th to 13th April next. The course will consist of lectures and practical work and is primarily intended for industrial users of radioactive isotopes. Application forms and further details can be obtained from the Isotope School and, as the number of places is limited, these should be returned by 9th March.

National Radio Show

The Queen has again consented to be patron of the National Radio Show to be held this year at Earls Court, London, from 22nd August to 1st September. For the first time the Independent Television Authority and the commercial television programme contractors will be co-operating in the exhibition. The B.B.C. will again have a large studio and outside broadcast arena in and from which programmes will be released and transmitted daily. Other exhibits on the first floor will include a careers and electronics display and, it is expected, exhibits by the three Services. The main part of the exhibition on the ground floor will, as before, be devoted to the stands of the individual manufacturers, many of whom will also have offices and demonstration rooms for v.h.f. and high-fidelity sound as well as television.

Electrical Industries Club

Mr. Halford Reddish, F.C.A., chairman and managing director of the Rugby Portland Cement Co., Ltd., was the guest speaker at the Electrical Industries Club luncheon which was held at the Connaught Rooms, London, on 14th February. He spoke seriously on economic problems of to-day. The luncheon was well attended and Mr. Leslie Gamage, M.C., M.A., vice-chairman and joint managing director, General Electric Co., Ltd., president of the Club, took the chair. Mr. T. W. Heather, M.C., director and sales manager, G.E.C., thanked Mr. Reddish for his address.

Nickel Alloys By Powder Metallurgy

Powder metallurgy is now a well-established technique for the production of metals and alloys for specialised uses and its application to wrought nickel and nickel alloys has been found to offer a number of advantages both in the manufacturing processes and in the properties of the final products. One of the most important is the high level of purity which can be expected as compared with materials prepared by conventional melting methods. Thus it is possible to exercise much closer control over properties.

These advantages are particularly useful in the electronics industry where there is a need for nickel alloys to meet stringent specifications as exemplified by metals for thermionic valve construction, alloys with special expansion characteristics and magnetic materials.

For these and similar purposes, alloys prepared by powder metallurgy methods are available in various compositions in the form of sheet and strip, rod, wire and tube.

A new publication "Wiggin Nickel Alloys by Powder Metallurgy" describes the method of production and includes tables of properties showing the remarkable improvements which may be obtained. Copies may be had from the publication department of Henry Wiggin & Co., Ltd., Thames House, Millbank, London, S.W.1.

Factory Equipment Exhibition

The Factory Equipment Exhibition which is being held at Earls Court, London, from 9th to 14th April, will be the most comprehensive display of factory equipment and services ever held under one roof. It will be opened by the President of the Board of Trade, Mr. G. E. P. Thorneycroft. Like previous exhibitions it is sponsored by the *Factory Manager* and *Factory Equipment News*. Over 250 companies are taking part and the exhibition will occupy some 250,000 sq ft of floor space. Exhibits will include lighting, heating, ventilation plant, materials handling, electric motors and control gear, industrial, hydraulic, electric and pneumatic tools and equipment, welding equipment and accessories, and electronic and scientific instruments.

The Ely Electrical Co.'s new showroom

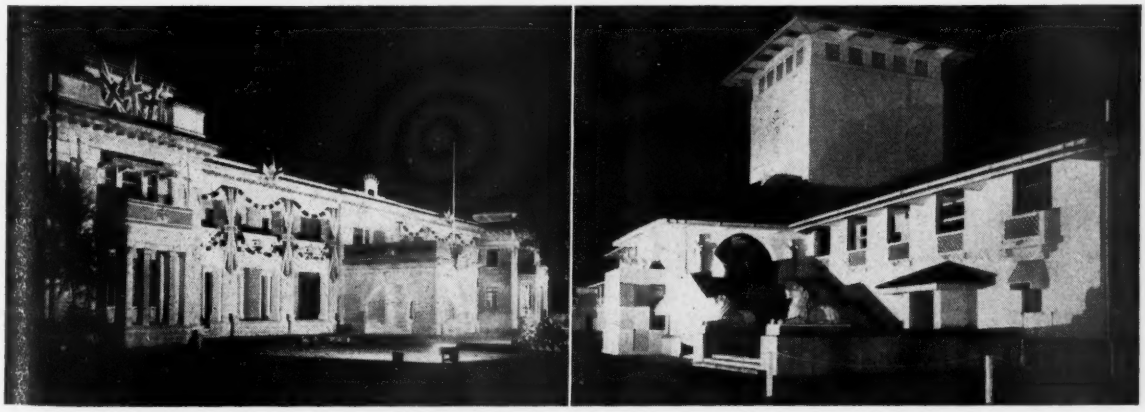
Ely Contractors' New Showroom

An attractive new showroom was opened recently by the Ely Electrical Co., Ltd., in High Street, Ely, Cambs. Much larger than the company's old Market Street premises, it allows for a greater and more comprehensive display of electrical goods. The fittings, all independently wired, cover a wide range from cookers, lamps and appliances to the necessary plugs. The showroom is managed by Mrs. C.M. Denley, wife of the managing director, Mr. J. E. Denley.

Venezuelan Plant Contract

The contract for the installation of four 50 MW sets in the Caroni hydro-electric plant, Venezuela, has been awarded to a Swiss-German combine, reports the *Fortnightly Review* of the

Floodlighting and decorative lighting schemes to the value of £10,000 were provided by the General Electric Co., Ltd., to illuminate the principal buildings in towns which the Queen and the Duke of Edinburgh visited during their tour of Nigeria: Federal Public Works Department Headquarters and (right) the Supreme Court, Lagos



Bank of London & South America, Ltd. The combine's tender is said to have been the lowest of eleven, two from British concerns. The cost of the work is over 25 million bolivares (£2·7 million).

Brush Fellowship for Nottingham

A senior research fellowship has been established by the Brush Electrical Engineering Co., Ltd., in the Applied Science Faculty of Nottingham University to " stimulate research in the mechanical and electrical aspects of power generation, control and utilisation." The fellowship, valued at £600 to £750 a year, is open to graduates possessing a good degree in science or engineering.

International Electric Tool Conference

The Portable Electric Tool Manufacturers' Association announces that the annual conference of European electric tool manufacturers—being held for the first time in Britain—opens in London on 27th June. Delegates from most European countries are expected and discussions, in the main, will cover technical matters of mutual interest. The British manufacturers sponsoring the conference are the Consolidated Pneumatic Tool Co., Ltd., Desoutter Bros., Ltd., Kango Electric Hammers, Ltd., and Wolf Electric Tools, Ltd. So as to enable the continental delegates also to keep abreast of the latest British machine tool developments, the conference has been timed to coincide with the International Machine Tool Exhibition at Olympia.

Iron and Steel Plate Export Licences

The Board of Trade announces that licences will in future be required for the export to all destinations of all types of alloy and non-alloy iron and steel plate. The Order, the Export of Goods (Control) (Amendment No. 3) Order 1956, (S.I. 1956, No. 150), came into force on 13th February.

New J. & P. Factory

Johnson & Phillips' new factory at New Cross, London, is now nearing completion. The transfer of plant and machinery from the switchgear factory at Kidbrooke is well under way and some of the shops at New Cross are already in production. Previously, the building was occupied by the Mazawattee Tea Co., Ltd. Standing near the busy junctions on the London side of New Cross station the tall chimney has been a landmark for many years. Now, a new neon sign erected on the J. & P. factory is becoming an equally familiar sight.

Railway Modernisation

In connection with the railway modernisation plan, the British Transport Commission foresees that, during the next five years at least, British Railways workshops will, with but minor exceptions, be fully employed. This is on the assumption that the plan proceeds to schedule. The Commission will rely on outside industry for the manufacture of diesel and electric power equipment and may purchase complete locomotives and other equipment and components from industry. As a general rule, maintenance work will be carried out in British Railways workshops to the extent of their capacity, in accordance with present policy. There will be consultation at all times with manufacturers to ensure that the maintenance of new equipment supplied by them is correctly performed.

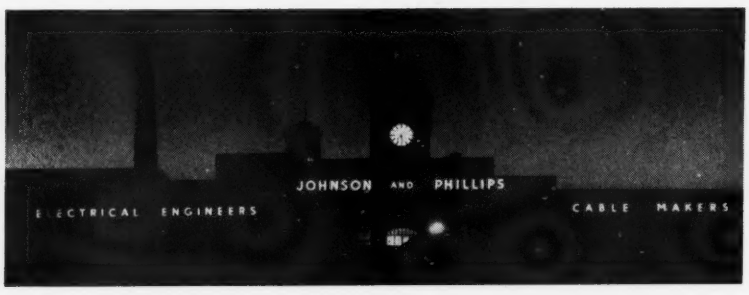
Educational

A residential introductory course on transistors has been arranged by Somerset Education Committee to be held from 19th to 23rd March at Dillington House, College for Adult Education, Ilminster. An advanced course on transistors will be held at the college from 25th to 29th June. From 14th to 18th May there will be a residential course on numerical analysis. Particulars can be obtained from the Warden of the Dillington House.

Domestic Appliance Exhibition

From 6th to 9th March Brown Brothers, Ltd., are staging a domestic appliance exhibition for the trade at their premises at Bateman's Row, which is adjacent to the head warehouses at Great Eastern Street, London, E.C.2. Among the well-known manufacturers who will be participating are:—Belling & Co., Ltd., Berry's Electric Ltd., British Vacuum Cleaner & Engineering Co., Ltd., Bulpitt & Sons, Ltd., Dimplex, Ltd., Fillery (G.B.), Ltd., General Electric Co., Ltd., L.G. Hawkins & Co., Ltd., Hotpoint Electric Appliance Co., Ltd., Morphy Richards, Ltd., Pifco, Ltd., Remington Rand, Ltd., and Smiths Clocks, Ltd.

The J. & P. New Cross factory



Austin Taylor Electrical New Works

Austin Taylor Electrical, Ltd., of Manchester, have recently opened a new works at Thorley Street, Failsworth. The site was acquired in 1950, and part of the premises have been in use as a branch works for some time past, but after extensive alterations and extended building, have now been taken over as the main works and offices. The floor space of the new works is about 20,000 sq ft and the site includes land which is intended to accommodate the further extensions which are now in the planning stage.

P.O.A. " Minibition "

The " Minibition " organised by the Purchasing Officers Association will be held concurrently with the national conference of the Association at the Spa, Scarborough, from 27th to 29th September next, and space may now be reserved by application to the secretary of the Association at Wardrobe Court, 146A, Queen Victoria Street, London, E.C.4.

Design Centre

The first exhibition at the Design Centre for British Industries (Council of Industrial Design) will be opened by the Duke of Edinburgh on 26th April next. The exhibition will include lighting, cooking and heating equipment, domestic appliances, and radio and television sets.

I.T.A. Midland Transmitter

The Independent Television Authority has begun high power (50 kW) test transmissions from its Midlands station. The station has been built by Pye, Ltd., and the twin eight-stack aerial system with supporting 445ft tower by Marconi's Wireless Telegraph Co.,Ltd.

Trade Announcements

The head office and factory of **Kenwell Electric, Ltd.,** have been moved from Bacup to Meanwood Works, Spotland Bridge, Rochdale, (telephone: Rochdale 47722).

The address of **West Instrument, Ltd.,** is now 52, Regent Street, Brighton, 1, (telephone: Brighton 28106).

Ekco-Ensign Electric, Ltd., has appointed Mr. F. Williamson as its representative covering the East Durham and North-East Yorkshire areas, and Mr. A. G. Fraser as representative covering the Southern Lancashire and part of Manchester area. Both Mr. Williamson and Mr. Fraser will operate from the northern area sales office at Blackett Street, Manchester, 12.

Electronics and Productivity

SCOTTISH CONFERENCE AND EXHIBITION

THE combined exhibition and conference on "Electronics and Productivity" staged in the Kelvin Hall, Glasgow, from 6th to 9th February by the South of Scotland Electricity Board was the first of its kind to be held in Glasgow. The Board's aim in promoting the exhibition was to present Scottish industrialists, works managers, works engineers and students with a comprehensive display of up-to-the-minute electronic equipment. At the same time the conference gave visitors an opportunity of hearing from distinguished specialists how these electronic devices are being rapidly applied in many industrial processes to achieve monetary savings, increased production and better quality. The nine papers submitted were summarised in our last issue.

In organising the event the Board was fully supported by the British Productivity Council, Glasgow Corporation and the Scottish Council (Development and Industry) whose chairman, Lord Polwarth, performed the opening ceremony. The interest and goodwill of the Scottish Home Department was evidenced by a visit from Lord Strathclyde, the Minister of State for Scotland, accompanied by Sir Charles Cunningham, Secretary of the Scottish Home Department.

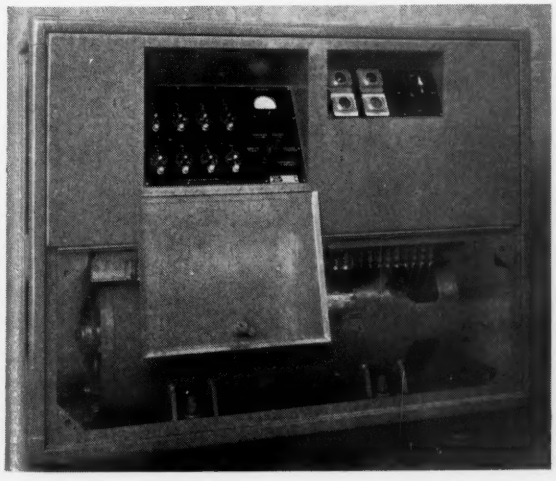
During the four days of the exhibition 8,500 visitors passed through the turnstiles and at each lecture session the hall, seating 500, was full. The cinema, showing a selection of the best electronic films, had a full audience for every programme. Exhibitors were unanimous in their reports of the high number and quality of inquiries received. The fact that admission was by invitation card helped to limit visitors to those really interested.

Industrialists, works managers, works engineers and post-graduates were all there and keenly interested. Perhaps it was the head of the small firm who derived the greatest benefit; the man with a small works or factory who has of necessity to be his own designer, works manager, and sales director all rolled into one.

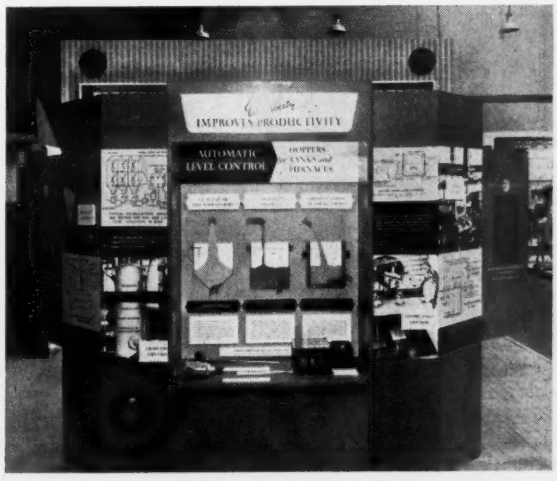
Mr. J. S. Pickles, chairman of the South of Scotland Electricity Board, touring the exhibition with Lord Polwarth, chairman of the Scottish Council (Development and Industry) and Mr. William Hutton, deputy chairman of the Board

Amongst the exhibitors were the large and world famous manufacturers side by side with small vigorously growing firms barely out of the "back-room" stage. On the purely scientific side the Universities of Edinburgh and Glasgow, and the Royal Technical College, Glasgow, were displaying some of their research and laboratory experimental work, and generally showing the excellent educational facilities now open to students in the electronics field. The Electrical Research Association's stand showed that this body is well to the fore in making known and encouraging work on electronic problems.

Turning to the industrial information services, on the British Productivity Council's attractive stand a back projection cinema showing industrial productivity films drew a constant audience, and another part of the stand was devoted to the latest pamphlets and books dealing with production, works management and allied subjects. The Electrical Development Association's stand also featured a cinema unit and examples of E.D.A. publications.



A Metropolitan-Vickers composite electronically controlled Ward-Leonard equipment which employs a flux resetter, showing the motor generator set and control panels



An exhibit on the stand of the Electrical Development Association shows the ways in which electricity can be used for automatic level control in hoppers, tanks, etc.

Cleverly designed panels illustrated the electronic units needed for various processes—the processes being indicated diagrammatically, whilst the actual electronic unit was shown in full.

The Scottish Council depicted, by means of a colour-lighted diagram, how their work was assisting industry in various parts of Scotland, and a large wall graph provided some of the most interesting information in the exhibition. Essentially it showed the growth in the use of electronics in the United Kingdom as a whole and in Scotland, and compared the respective growths with that in America.

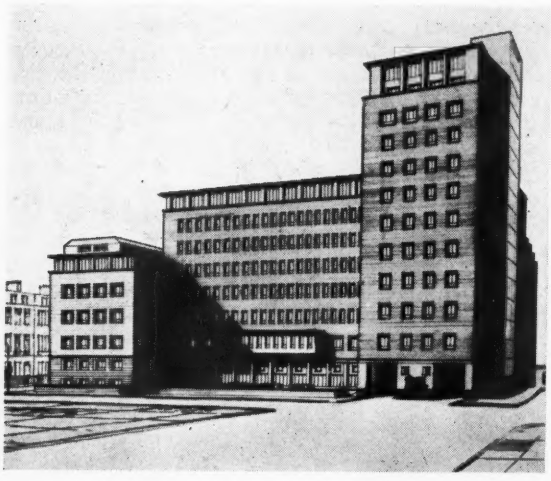
The Board's own stand was fitted out to form a comfortable visitors' lounge and information centre. By means of closed circuit television visitors were able to " look in " to the lecture in progress in the conference hall. Photographs decorating the stand showed some of the existing power stations and those now being built under the Board's construction programme which by 1960 aims to increase generating capacity by 50 per cent.

Extension of University College, London

DOUBLING THE OUTPUT OF ENGINEERS

LAST week University College, London, launched an appeal to all sections of British industry for immediate assistance towards a £2,000,000 project for training more engineers and so helping to overcome the serious shortage of qualified technicians.

In a joint appeal to industrial firms, Lord Cohen, chairman of the College Committee, and Lord Strang, chairman of the Engineering Appeal Committee, point out that graduate engineers are qualifying at a rate that falls far short of the national demand. Owing to inadequate accommodation and facilities, the College can accept only one of every nine applicants, and of these nine at least seven are fully qualified and suitable for entry to the Engineering Departments. Illustrative of this lack of facilities is the fact that the Engineering Departments, damaged during the war, have been no more than restored to their pre-1939 condition and are still housed in quarters which have hardly been extended for 30 years.



Artist's impression of the completed University College buildings which will accommodate 600 engineering students

The College's present yearly output is approximately 70 graduate engineers. As soon as a sum of £300,000 is raised, the first stage of the building programme can be completed, and this output will be stepped up by 50 per cent. If the £2,000,000 appeal is met in full, the College will be able to accommodate about 600 engineering students, corresponding to an annual intake of about 200, including candidates for higher degrees.

Under its development plans the College has acquired new sites adjoining the present Gower Street buildings. One site is immediately available for construction work estimated to cost £300,000, which is the first target of the Appeal. As further funds become available two additional buildings, including a tower block of twelve storeys, will be added.

Since 1945 the College has had an uphill task in carrying on its work. It suffered very heavy war damage. Well over £1,500,000 has since been spent on post-war reconstruction, but part only is recoverable from war damage claims; the balance has been met by sums from the University Grants Committee and other sources.

The initial response to this Appeal for funds for new engineering buildings has been most encouraging. Contributions amounting to a quarter of a million pounds have already been received, chiefly from the larger industrial groups. The Engineering Departments, which date from the foundation of the College, 120 years ago, are among the oldest established in Britain. University College itself can claim to be the original "University of London".

Lord Strang, at the launching of the appeal, repeated the statement above and added that he thought engineers gained a great deal from receiving their education in an institution like University College which gave instruction in the humanities, law, fine arts, architecture, town planning and many other studies. The Faculty of Engineering was closely related to other studies; this and the mingling of engineering students with others helped to make them " full and complete men."

Viscount Chandos, chairman of Associated Electrical Industries, Ltd., stressed the great need for more engineers and commended the scheme to the attention of industrialists.

Among the industrial undertakings which have promised to contribute to the £2,000,000 fund are the following:—Associated Electrical Industries, Ltd., Babcock & Wilcox, Ltd., the British Oxygen Co., Ltd., the Central Electricity Authority, the English Electric Co., Ltd., Ferranti, Ltd., W. T. Henley's Telegraph Works Co., Ltd., and Sulzer Bros. (London), Ltd.

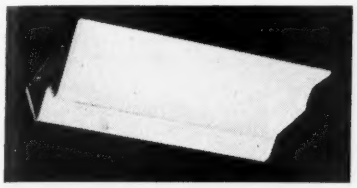
Conference on Sandwich Courses

To provide an opportunity for full discussion on matters relating to sandwich courses which are available to engineering students by the collaboration of technical colleges and industry, the Ministry of Education and the British Association for Commercial and Industrial Education have arranged to hold a one-day conference on " The Development of Sandwich Courses " at the Royal Festival Hall, London, S.E.1, on Thursday, 22nd March. Application forms and full particulars of the conference are available from the conference secretary, c/o BACIE, 8, Hill Street, London, W.1.

NEW ELECTRICAL EQUIPMENT

Commercial Fluorescent Fitting

The Atlas FI/2080 fluorescent fitting announced by THORN ELECTRICAL INDUSTRIES, LTD., 105-109, Judd Street, London, W.C.1, represents a complete departure from



Section of the Atlas FI/2080 commercial fluorescent fitting (Thorn Electrical Industries)

conventional standards of design and is ideally suitable for modern offices and stores.

Housing two 5 ft 80 W tubes, this unusual "W" shaped fitting ensures ample upward light while reducing glare at working level to the minimum. Black plastic end panels are inset slightly to emphasize the shape of the diffuser and provide a pleasant contrast with the opal "Perspex" body. Designed for rod or chain suspension, it is easily cleaned and maintained, and incorporates Atlas "Glowswitch" or "Quickstart" control gear.

The price, complete with control gear, is £20 17s 8d plus £3 4s purchase tax in the United Kingdom.

Orbital Sander Attachment

A new orbital sanding attachment has been designed by BLACK & DECKER, LTD., Harmondsworth, Middlesex, that can be fitted to either their ¼in utility drill or their sander-polisher drill. The chuck is removed and replaced by a screw-head and the attachment is fitted to either of the two power units by means of two clips, which fit into the ventilating slots of the tool. The paper clips are operated from the side of the bottom plate and remain open when changing abrasive paper, permitting use of both hands to clamp the paper in quickly. The machine can be used right up against edges such as stair risers without marking the surface in any way.

A sponge rubber pad and polishing cloth are supplied as standard equipment with six assorted grit sanding papers. Also available is an abrasive and polishing pack consisting of a lambswool bonnet, a wire wool and fabric finishing pad and three double-sided, non-clog sand screens. The finishing pad ensures that a perfectly smooth finish is obtained before french polishing, staining or painting. The price of the attachment is £4 15s. to those already possessing a power unit.

Cable Markers

CREATORS, LTD., Plansel Works, Sheerwater, Woking, Surrey, have introduced a new form of cable marker. Three types are available, one series in natural rubber, a second in synthetic rubber and a third in p.v.c. These are marketed under the trade names of "Plantex", "Plansyn" and "Planvin" respectively.

Not only are these sleeves extremely durable but as the result of a special printing process the caption, printed to any desired specification, is indelible. They are produced in a wide range of fast colours and have been rigidly tested to withstand acids, oils, grease, alkalis, etc., and they are also proof against heat, friction and strong light.

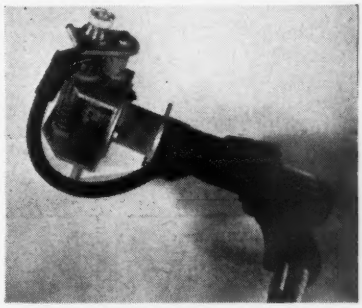
Cable Drum Jack

The "Cromack" cable drum jack manufactured by BENJAMIN CROMACK, LTD., Wharf Street Works, Shipley, Yorkshire, has been designed to handle all types of smaller cable drums and is also suitable for use when erecting light (B.S. 1320) and low voltage overhead lines. The frame is of tubular steel with welded joints and it is capable of handling drums up to 12 cwt, not exceeding 2ft 9in wide by 4ft diameter. It is claimed that one man can jack up a standard drum of 2,000 yd of 0·05 sq in copper conductor within 30 seconds.

The jack has no moving parts and its design is such that it does not sink into soft ground. One drum jack replaces two ratchet jacks and it can be pulled or carried across rough country single handed. The price is £8 plus carriage costs.

Stud Welding in Confined Spaces

An attachment for the Nelson stud welding tool has been developed by CROMPTON PARKINSON, LTD., Crompton House, Aldwych, W.C.2, which enables studs to be welded at right-angles to the tool. It therefore greatly facilitates the equipment's use in confined spaces and is particularly

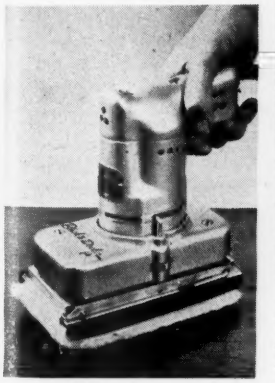


Nelson stud welding tool fitted with right angled attachment

useful when studs have to be welded to awkwardly located work faces, such as in rolled steel sections.

The attachment takes the place of the tool's standard chuck and leg assemblies, and is designed for easy fitting to the moulding of the tool by means of the three screws which are normally used to hold the quick adjustable leg bracket in position. The attachment can be fitted to the tool at any angle relative to the tool hand grip, thereby further facilitating the equipment's use for applications where operators have hitherto been unable to avoid obstructions. Apart from this, operation of the tool is exactly the same as with the standard arrangement. A patented fluxed stud is inserted in the chuck; a porcelain ferrule—the purpose of which is to prevent oxidisation of the weld metal—is held round the end of the stud; and then with the now loaded tool pressed sideways against the work-piece, the trigger button is depressed and the weld automatically completed.

Studs of all diameters can be used in the special short chucks provided and the standard leg and foot assembly can be employed at right-angles to the tool, shortened, if necessary, to the depth of the attachment.



Black & Decker orbital sander

Cable drum being placed in the "Cromack" jack

Domestic Electrical Equipment

Electric Kettles

FOR providing the most convenient way of boiling small quantities of water quickly and efficiently the electric kettle probably has no equal. An advantage is, of course, that its use need not necessarily be confined to the kitchen; it can be used in the dining-room or even in a bedroom providing that there is a suitable 13 or 15 A socket outlet available.

Apart from differences in styling, most models conform to a more or less standard pattern and the use of immersion type elements is now practically universal. Most makes incorporate safety cut-outs which operate if the kettle is inadvertently switched on when empty or boils dry; these may be either self-resetting or of the ejector type.

The average capacity is between three and four pints with a loading ranging from 1,000 to 1,500 W; "super-speed" models incorporate a 2 kW element. Whistling kettles are available from Best Products, Ltd., and Bulpitt & Sons, Ltd., and a special feature of the Russell Hobbs vapour controlled kettle is that it switches itself off when the water reaches boiling point.

With few exceptions prices show a slight increase compared with a year ago; it must also be remembered that the electric kettle is now subject to purchase tax in the United Kingdom at the rate of 30 per cent.

Manufacturer	Name or Model	Capacity	Element Loading	Body	Handle	Special Features	Price (excl. tax)	Purchase Tax
BESCOL (ELECTRIC) LTD., 118, Parkfield Road, Saltley, Birmingham, 8.	"Elephant" 208	3 pint	1,500 W and 2,000 W	Chromium plated copper	Black Bakelite	Thermostatic safety device	£3 19 6 (1½ kW) £4 0 6 (2 kW)	£0 17 5 (1½ kW) £0 17 8 (2 kW)
	"Elephant" 214	3½ pint	1,500 W and 2,000 W	Polished aluminium	Black Bakelite	Thermostatic safety device	£2 18 6 (1½ kW) £2 19 6 (2 kW)	£0 12 10 (1½ kW) £0 13 0 (2 kW)
	"Mysto Maid" 2006	3½ pint	1,500 W and 2,000 W	Chromium plated copper	Black Bakelite	Thermostatic safety device	£4 0 6 (1½ kW) £4 1 6 (2 kW)	£0 17 8 (1½ kW) £0 17 11 (2 kW)
BEST PRODUCTS, LTD., Felix Works, Felixstowe, Suffolk.	"Fanfare"	4 pint	1,500 W with cut-out	Chromium plated copper (a) and polished lacquered copper (b)	Black Bakelite	Organ toned musical alarm	£4 15 0 (a) £4 7 6 (b)	£1 0 10 (a) £0 19 2 (b)
	"Family Three"	3 pint	1,250 W and 1,500 W	Chromium plated copper	Black Bakelite	Safety lid engagement	£3 14 6 (1,250 W) £3 17 0 (1,500 W)	£0 16 4 (1,250 W) £0 16 10 (1,500 W)
	"Family Three"	3 pint	1,250 W and 1,500 W	Polished lacquered copper	Black Bakelite	Safety lid engagement	£3 7 0 (1,250 W) £3 9 6 (1,500 W)	£0 14 8 (1,250 W) £0 15 3 (1,500 W)
BULPITT & SONS, LTD., Icknield Street, Birmingham, 18	"Kitchen" 200	3½ pint	1,000 W	Brown vitreous enamel	Vitreous enamel	—	£2 14 0	£0 11 10
	"Kitchen" 205	3½ pint	1,500 W	Brown vitreous enamel	Vitreous enamel	—	£2 16 0	£0 12 3
	"Kitchen" C.200	3½ pint	1,000 W	Cream and green vitreous enamel	Vitreous enamel	—	£2 18 0	£0 12 8
	"Kitchen" C.205	3½ pint	1,500 W	Cream and green vitreous enamel	Vitreous enamel	—	£3 0 0	£0 13 2
	"Royal" CH.102	2 pint	850 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 8 0	£0 14 11
	"Royal" CH.103	3 pint	1,000 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 17 6	£0 17 0
	"Royal" CH.103A	3 pint	1,500 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 19 6	£0 17 5

Manufacturer	Name or Model	Capacity	Element Loading	Body	Handle	Special Features	Price (excl. tax)	Purchase Tax
BULPITT & SONS, LTD., Icknield Street, Birmingham, 18 *(continued)*	"Royal" CH.105	5 pint	2,000 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£4 12 6	£1 0 3
	"Popular" C.223	3 pint	1,000 W	Polished copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 6 6	£0 14 7
	"Popular" C.223A	3 pint	1,500 W	Polished copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 8 6	£0 15 0
	"Popular" C.226	6 pint	2,000 W	Polished copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£4 3 6	£0 18 4
	"Popular" CH.223	3 pint	1,000 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 14 0	£0 16 3
	"Popular" CH.223A	3 pint	1,500 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 16 0	£0 16 8
	"Popular" CH.224A	4 pint	1,500 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£4 3 6	£0 18 4
	"Popular" CH.224B	4 pint	2,000 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£4 6 0	£0 18 10
	"Popular" CH.226	6 pint	2,000 W	Chromium plated copper	Heat insulated moulded plastic	Safety positioned knob and steam vents	£4 12 6	£1 0 3
	"Popular" A.223	3 pint	1,000 W	Aluminium	Heat insulated moulded plastic	Safety positioned knob and steam vents	£2 15 6	£0 12 2

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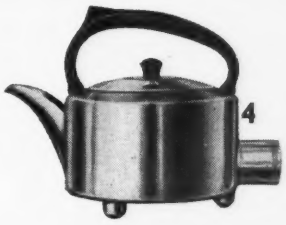
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1. *Bulpitt "Popular" kettle*
2. *Bulpitt "Royal"*
3. *Bescol "Mysto Maid" 2006*
4. *Bescol "Elephant" 208*
5. *Best "Family Three"*
6. *Best "Fanfare"*

ELECTRIC KETTLES . . . . . *continued*

Manufacturer	Name or Model	Capacity	Element Loading	Body	Handle	Special Features	Price (excl. tax)	Purchase Tax
BULPITT & SONS, LTD *(continued)*	" Popular " A.223A	3 pint	1,500 W	Aluminium	Heat insulated moulded plastic	Safety positioned knob and steam vents	£2 17 6	£0 12 8
	" Popular " A.224A	4 pint	1,500 W	Aluminium	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 3 0	£0 13 10
	" Popular " A.224B	4 pint	2,000 W	Aluminium	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 5 6	£0 14 5
	" Popular " A.226	6 pint	2,000 W	Aluminium	Heat insulated moulded plastic	Safety positioned knob and steam vents	£3 9 0	£0 15 1
	Whistling CH.340	4 pint	1,250 W	Chromium plated copper	Heat insulated moulded plastic	Trigger action lid with built-in whistle	£5 0 0	£1 1 11
	Kettle and Saucepan CH.353	Kettle: 3 pint Inner Pan: 1½ pint	2-heat 1,000/125 W	Chromium plated copper. Aluminium pan	Heat insulated moulded plastic	Hinged kettle handle	£4 17 6	£1 1 4
CAMPBELL ENGINEERING CO., LTD., Sherman Road, Bromley, Kent.	" Hotway "	3½ pint	1,500 W	Polished aluminium	Moulded plastic, various colours	Safety cut-out	£2 15 4	£0 12 2
CHALFONT ELECTRICAL PRODUCTS, LTD., Tyrrell Street, Leicester.	" Streamline "	4 pint	1,500 W	Polished aluminium	Moulded plastic	All welded construction	£2 14 0	£0 11 10
	" Popular "	4 pint	1,500 W	Polished aluminium	Aluminium strip, moulded grip	—	£2 9 0	£0 10 9
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hall Street, Dudley, Worcs.	" C.W.S."	4 pint	1,250 W	Polished aluminium	Black Bakelite	—	£2 16 9	£0 12 9
	" C.W.S."	4 pint	1,500 W	Polished aluminium	Black Bakelite	—	£2 19 6	£0 13 4
	" C.W.S."	4 pint	1,250 W	Vitreous enamel	Vitreous enamel	—	£2 13 4	£0 12 0
A. D. DAVIDSON ELECTRIC CO., 62-66, Granville Street, Birmingham, 1.	" Adele " K.804	4½ pint	1,500 W	Chromium plated copper	Bakelite	Specially designed handle and knob	£4 16 0	£1 1 1
DEPENDABLE PRODUCTS, LTD., Queensway, Team Valley Trading Estate, Gateshead, 11.	" Standard "	3½ pint	1,500 W	Aluminium (a) and Chromium (b)	Moulded plastic	—	£2 18 4 (a) £3 6 8 (b)	£0 12 9 (a) £0 14 7 (b)
	" Queensway "	3½ pint	1,500 W	Aluminium (a) and Chromium (b)	Moulded plastic	—	£3 5 0 (a) £3 13 4 (b)	£0 14 3 (a) £0 16 1 (b)
EASIPOWER, LTD., 213-215, Gloucester Place, London, N.W.1.	A.K.	4 pint	1,500 W	Polished aluminium	Steel reinforced plastic	—	£2 14 6	£0 12 0
	A.K.S.	3½–4 pint	1,500 W	Polished aluminium	Steel reinforced plastic	Streamlined	£2 19 6	£0 13 0
	C.K.	3½–4 pint	1,500 W	Chromium plated copper	Steel reinforced plastic	Streamlined	£3 15 0	£0 16 6
ELGA PRODUCTS, LTD., Railway Place, Wimbledon, S.W.19.	" Conquest " A.5.	3½ pint	1,000 W	Aluminium	Steel reinforced plastic	Large lid, fast pouring spout	£2 19 0	£0 13 0
	" Conquest " A.10.	3½ pint	1,500 W	Aluminium	Steel reinforced plastic	Large lid, fast pouring spout	£3 1 0	£0 13 5

Manufacturer	Name or Model	Capacity	Element Loading	Body	Handle	Special Features	Price (excl. tax)	Purchase Tax
ELGA PRODUCTS, LTD *(continued)*	"Conquest" A.12.	3½ pint	2,000 W	Aluminium	Steel reinforced plastic	Large lid, fast pouring spout	£3 3 0	£0 13 10
	"Conquest" A.15.	3½ pint	1,000 W	Chromium plated copper	Steel reinforced plastic	Large lid, fast pouring spout	£3 17 6	£0 17 0
	"Conquest" A.20	3½ pint	1,500 W	Chromium plated copper	Steel reinforced plastic	Large lid, fast pouring spout	£3 19 6	£0 17 5
	"Conquest" A.22.	3½ pint	2,000 W	Chromium plated copper	Steel reinforced plastic	Large lid, fast pouring spout	£4 2 0	£0 18 0
	"Rainbow" A.11.	3½ pint	1,500 W	Anodized aluminium, red, blue and green.	Steel reinforced plastic	Large lid fast pouring spout	£3 9 0	£0 15 2
ELTRON (LONDON), LTD., Strathmore Road, Croydon, Surrey.	"Combinax"	2 pint	500, 700 and 1,000 W	Polished aluminium	Black Bakelite	Removable element	£1 14 0 (500 W) £1 17 0 (700 W) £2 5 0 (1,000 W)	£0 7 8 (500 W) £0 8 4 (700 W) £0 10 1 (1,000 W)
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	"Teatime" U.95696	4 pint	1,000 or 1,500 W	Chromium plated copper	Heat resisting plastic	Large lid, fast pouring spout	£3 17 0	£0 16 10
	U.95729	3 pint	1,500 W	Polished aluminium	Moulded plastic	—	£2 10 0	£0 11 0
	"Cleanline" U.95634	4 pint	1,500 W	Anodized aluminium, red, blue and green	Moulded plastic	—	£3 9 0	£0 15 2
FARBURKE PRODUCTS, LTD., 35-37, Alfred Place, London, W.C.1.	"Fortune"	3 pint	1,000 and 1,500 W	Polished aluminium	Black Bakelite	—	£2 5 0	£0 9 10
	"Fortune"	4 pint	1,000 and 1,500 W	Polished aluminium	Black Bakelite	—	£2 9 6	£0 10 10

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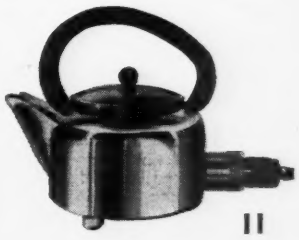
7. *C.W.S. 4-pint aluminium model*
8. *Eltron "Combinax" tea kettle*
9. *Davidson "Adele"*
10. *Easipower model AK aluminium kettle*
11. *Elga "Conquest"*
12. *Campbell Engineering Co.'s "Hotway"*
13. *Falk's U.95729 3-pint model*
14. *Falk's "Teatime" U.95696*
15. *Chalfont "Streamline"*



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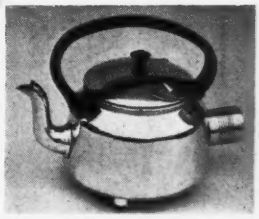

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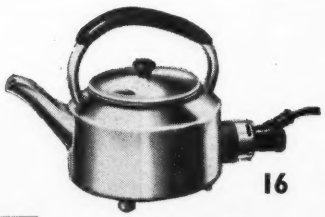
ELECTRIC KETTLES . . . . . *continued*

Manufacturer	Name or Model	Capacity	Element Loading	Body	Handle	Special Features	Price (excl. tax)	Purchase Tax
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2.	D.5173	3 pint	2,000 W	Polished aluminium	Heat insulated plastic	Super-speed boiling	£2 19 6	£0 13 1
	D.5175	5 pint	2,000 W	Polished aluminium	Heat insulated plastic	Super-speed boiling	£3 8 0	£0 14 11
	D.5183	3 pint	2,000 W	Polished aluminium	Heat insulated plastic	Super-speed boiling, corrosion resistant	£3 3 0	£0 13 10
	D.5185	5 pint	2,000 W	Polished aluminium	Heat insulated plastic	Super-speed boiling, corrosion resistant	£3 11 6	£0 15 8
	D.5235	5 pint	2,000 W	Chromium plated copper	Heat insulated plastic	Super-speed boiling	£4 19 6	£1 1 10
	D.5235A	3 pint	2,000 W	Chromium plated copper	Heat insulated plastic	Super-speed boiling	£4 2 6	£0 18 1
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, London, W.C.2.	L.G.H.707	3½ pint	1,500 W	Polished aluminium	Steel with plastic grip	—	£2 19 6	£0 13 0
	L.G.H. 565	3½ pint	1,500 W	Polished aluminium	Steel with plastic grip	—	£3 7 6	£0 14 10
	L.G.H.666	3½ pint	1,500 W	Chromium plated copper	Steel with plastic grip	—	£3 19 6	£0 17 6
	L.G.H.404	3½ pint	1,500 W	Enamelled	Metal	—	£2 12 6	£0 11 6
HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, W.C.2.	"Torribar" H.K.140	3 pint	1,500 W	Polished aluminium	Plastic on metal brackets	—	£3 2 6	£0 13 9
	"Torribar" H.K.150	3 pint	1,500 W	Chromium plated copper	Plastic on metal brackets	—	£4 1 6	£0 17 11

16. *Premier "Pylon"*
17. *Russell Hobbs vapour-controlled kettle*
18. *G.E.C. 3-pint kettle*
19. *F. J. Tomlinson's "Countess"*
20. *Metway DA.429*
21. *L. G. Hawkins LGH.404*
22. *L. G. Hawkins LGH.666*
23. *"Sunco" 4-pint*
24. *Hotpoint HK.150 kettle*
25. *Lincass 951*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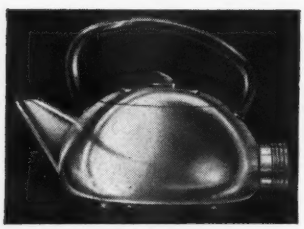
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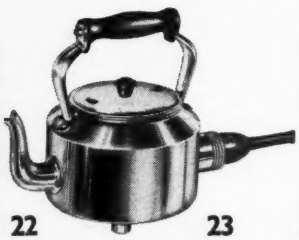
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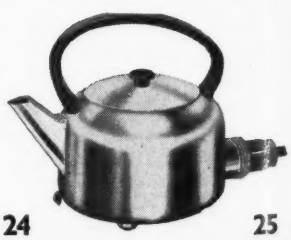
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Manufacturer	Name or Model	Capacity	Element Loading	Body	Handle	Special Features	Price (excl. tax)	Purchase Tax
	"Torribar" H.K.160	4 pint	1,500 W	Chromium plated copper	Plastic on metal brackets	—	£4 12 6	£1 0 4
LINCASS ELECTRIC, LTD. Guildford Street, Chertsey, Surrey.	950/951	4 pint	1,000 and 1,500 W	Chromium plated copper	Black Bakelite	—	£3 17 6 (1 kW) £3 19 6 (1½ kW)	£0 17 6 (1 kW) £0 17 11 (1½ kW)
	850/851	4 pint	1,000 and 1,500 W	Polished copper	Black Bakelite	—	£3 10 6 (1 kW) £3 12 6 (1½ kW)	£0 15 10 (1 kW) £0 16 4 (1½ kW)
	780/781	4 pint	1,000 and 1,500 W	Polished aluminium	Black Bakelite	—	£3 2 6 (1 kW) £3 4 6 (1½ kW)	£0 14 0 (1 kW) £0 14 6 (1½ kW)
	770/771	4 pint	1,000 and 1,500 W	Polished aluminium	Black Bakelite	—	£2 15 6 (1 kW) £2 17 6 (1½ kW)	£0 12 6 (1 kW) £0 13 0 (1½ kW)
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7.	"Miniway New" DA.389	2 pint	750 W (non-automatic)	Polished aluminium	Moulded plastic	—	£1 18 9	£0 8 5
	"Miniway De-Luxe" DA.429	2 pint	750 W	Polished aluminium	Moulded plastic	—	£2 2 9	£0 9 3
	"Boilaway" DA.559	4 pint	1,500 W	Polished aluminium	Moulded plastic	—	£2 15 9	£0 12 1
	"Boilaway" DA.549	4 pint	1,000 W	Polished aluminium	Moulded plastic	—	£2 14 9	£0 11 10
	"Fastaway" DA.589	4 pint	1,800 W	Polished aluminium	Moulded plastic	—	£2 18 9	£0 12 9
	"Fastaway" DA.630	4 pint	2,000 W	Polished aluminium	Moulded plastic	—	£3 3 0	£0 13 8
	"Majaway" DA.699	6 pint	2,000 W	Polished aluminium	Moulded plastic	—	£3 9 9	£0 15 1
PREMIER ELECTRIC HEATERS, LTD., Keeley Street, Birmingham, 9.	"Pylon" 2939S, 2939 and 2939A	3 pint	2,000 W (2939S), 1,500 W (2939) and 1,000 W (2939A)	Chromium plated copper	Moulded plastic	Safety cut-out	£4 1 6 (2939S) £3 19 6 (2939) £3 17 6 (2939A)	£0 17 11 (2939S) £0 17 6 (2939) £0 17 0 (2939A)
	"Pylon" 2947S and 2947	4½ pint	2,000 W (2947S) and 1,500 W (2947)	Chromium plated copper	Moulded plastic	Safety cut-out	£4 12 6 (2947S) £4 10 6 (2947)	£1 0 4 (2947S) £0 19 11 (2947)
	"Pylon" 2833S, 2833 and 2833A	3 pint	2,000 W (2833S), 1,500 W (2833) and 1,000 W (2833A)	Polished aluminium	Moulded plastic	Safety cut-out	£2 19 6 (2833S) £2 17 6 (2833) £2 15 6 (2833A)	£0 13 1 (2833S) £0 12 8 (2833) £0 12 3 (2833A)
	"Pylon" 2837S, 2837 and 2837A	3 pint	2,000 W (2837S), 1,500 W (2837) and 1,000 W (2837A)	Polished copper, lacquered	Moulded plastic	Safety cut-out	£4 1 6 (3837S) £3 19 6 (3837) £3 17 6 (3837A)	£0 17 11 (3837S) £0 17 6 (3837) £0 17 0 (3837A)
RUSSELL HOBBS, LTD., 1, Bensham Lane, West Croydon, Surrey.	"Russell Hobbs" K.L.	3½ pint	1,750 W	Chromium plated copper	Moulded plastic	Vapour controlled, switches off when water boils	£4 18 9	£1 1 8
	"Russell Hobbs" K.L. Spa.	3½ pint	1,750 W	Anodized aluminium, silver or lustre	Moulded plastic	Vapour controlled, switches off when water boils	£4 1 6	£0 17 11
SUN ELECTRICAL CO., LTD., 118-124, Charing Cross Road, London, W.C.2.	"Sunco" H5540	4 pint	1,250 W	Polished aluminium	Bakelite	—	£2 17 6	£0 12 5
F. J. TOMLINSON, LTD., Hall Carr Mill, Rawtenstall, Lancs.	"Countess"	4 pint	1,500 W	Polished aluminium	Bakelite and metal	—	£2 9 11	£0 11 3
	"Marchioness"	3½ pint	1,500 W	Polished aluminium	Bakelite	—	£2 17 6	£0 12 11
	"Baroness"	10 pint	1,500 W	Polished aluminium	Bakelite and metal	—	£3 6 6	£0 15 0

GENERATION AND DEVELOPMENT

Serious Effect of Capital Cuts

Speaking at a meeting of the Merseyside and North Wales Electricity Consultative Council recently the chairman (Mr. H. Evans, J.P.) said that the amount by which the Board's capital expenditure would be reduced during the next financial year as a result of action already taken did not approach the amount by which the C.E.A. had asked the Board to cut its spending. The Authority had been informed that to attain the substantial reduction required it would be necessary to reduce considerably the amount of money spent on rural electrification. If the figure that had been suggested was enforced in the Area there would be a cut of approximately a half in the rate of progress achieved last year in connecting farms and dwellings in rural areas.

The chairman said that at a meeting with the C.E.A. last November he had taken the opportunity of emphasising the magnitude of the rural problem in the Area. In Wales the proportion of farms connected was much lower than in England. He also pointed out that the skilled labour required had been trained at considerable expense and if a substantial cut were made it would probably mean the loss of the men's services. A great sense of disappointment and frustration would be felt by the people living in the rural areas which had not yet been developed if the Board was forced to cut its programme.

Output in January

Last month 8,588 million kWh was generated by the Central Electricity Authority, the North of Scotland Hydro-Electric Board and the South of Scotland Electricity Board, an increase of 7·5 per cent as compared with the January, 1955, output of 7,988 million kWh. There was no change in the installed plant capacity during the month, the total remaining at 22,489 MW.

C.E.A. Contracts

Contracts have been placed by the Central Electricity Authority during the past month for power stations, transforming stations and transmission lines, amounting in the aggregate to £7,535,103. The principal contracts include:—

Northfleet power station, Kent: One 120,000 kW reheat turbo-generator, feed heating and condensing plant.—General Electric Co., Ltd.

Marchwood power station, near Southampton: High pressure pipework and valves.—Stewarts & Lloyds, Ltd.

Poole power station: Steel framework for turbine house and boiler house buildings.—Alex. Findlay & Co., Ltd.

Portishead "B" power station, near Bristol: Structural steelwork.—Sir Wm. Arrol & Co., Ltd.

Hayle power station, Cornwall: One 20,000 kW turbo-generator.—British Thomson-Houston Co., Ltd. One 220,000 lb/hr boiler.—Yarrow & Co., Ltd. Condensing and feed heating plant.—Mirrlees Watson Co., Ltd. Ash and dust handling plant.—Babcock & Wilcox, Ltd.

South Denes power station, Yarmouth: Foundations, river works, culverts and outfall.—Peter Lind & Co., Ltd.

Little Barford "B" power station, near St. Neots: Foundations and building works.—Mitchell Construction Co.

High Marnham power station, near Tuxford: Preliminary civil engineering works.—M. J. Gleeson (Contractors), Ltd.

Willington "A" power station, near Derby: High pressure pipework and valves.—Aiton & Co., Ltd.

Aberthaw power station: Road and rail access, river diversion and preliminary works.—John Morgan (Builders), Ltd.

Rogerstone power station: Building works and superstructure.—Sir Robert McAlpine & Sons, Ltd. 66 kV 1,500 MVA switchgear.—English Electric Co., Ltd.

Clipstone substation: Two 60 MVA 132/33 kV transformers.—Hackbridge & Hewittic Electric Co., Ltd.

Tottenham substation: Two 60 MVA 132/33 kV transformers.—Crompton Parkinson, Ltd.

Iver substation, Bucks: 66 kV 2,500 MVA switchgear.—British Thomson-Houston Co., Ltd.

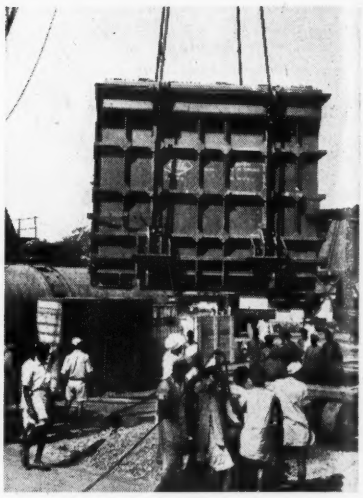
West Weybridge substation: 27 kV 7,500 MVA switchgear.—A. Reyrolle & Co., Ltd.

Ipswich-Stowmarket and Stowmarket-Bury St. Edmunds: 132 kV overhead lines.—W. T. Henley's Telegraph Works Co., Ltd.

Hereford-Stourport/Worcester: 132 kV overhead lines.—Watsham's, Ltd.

Transformers for India

The accompanying picture shows a Johnson & Phillips 30 MVA 100/23·1 kV transformer, delta/star connected, being unloaded at Bombay Docks. This is the first of two 30 MVA transformers supplied to the Tata Hydro-Electric Supply Co., Ltd., in connection with a scheme to raise the system transmission voltage to 110 kV. The transformers are to be installed at the Parel substation.



A Johnson & Phillips 30 MVA transformer being unloaded at Bombay Docks

Tariff Representations

Feeling that the tariff revisions introduced by the Merseyside and North Wales Electricity Board were not equitable as between all consumers, the Consultative Council last year made representations to the Board and later to the C.E.A., which suggested that there should be further consultation with the Board. After considering information since supplied by the Board the Council has now agreed that no useful purpose would be served in pressing the matter further at the present time. The points which the Council made have been noted by the Board and will be taken into account when the tariffs are altered again. It has also been agreed that in future, when tariff revisions are contemplated, joint consultation will take place between representatives of the Board and the Tariffs Committee at the earliest possible stage.

Turkish Hydro-Electric Development

Most of the work on the Seyhan dam and hydro-electric power plant which started in the summer of 1953 will be completed in March of this year. Situated in Southern Anatolia, near Adana, the new power station will have an annual output of 284 million kWh.

Irrigation and Power Scheme

The Ministry of Lands and Land Development of Ceylon has decided to go ahead with an irrigation and power project on the Heda Oya and Karanda Oya rivers in the south-east of the island.

ELECTRICITY GENERATED AND PLANT INSTALLED

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total		
Central Electricity Authority	4,152	92	29.4	7,855	12	7,881	7,408	20,533
North of Scotland H.E.B.	27	—	1.6	43	134	183	181	704
South of Scotland E.B.	266	6	0.1	489	35	524	498	1,252
Total for January, 1956	4,445	98	31.1	8,387	181	8,588*	8,087	22,489
Corres. total for January, 1955	4,270	112	29.0	7,795	175	7,988	7,531	20,606
Inc. or dec. as a percentage of 1955	+4.1	−12.5	+7.2	+7.6	+3.4	+7.5	+7.4	+9.1

* The total figure includes generation by other methods amounting to 20 million kWh.

PARLIAMENTARY REPORT

Technical Education

Mr. R. A. Butler, Lord Privy Seal, replying to Mr. E. Fletcher, said that the contact between the departments which shared the responsibility for scientific and technical education was close and continuous. The White Paper on Technical Education which the Government would publish shortly would demonstrate that no administrative considerations would be allowed to stand in the way of a vigorous expansion of the facilities for this purpose.

Mr. Fletcher said that if we were to make good the deplorable leeway which existed in technological advances between this country and Russia a really vigorous drive was needed and no administrative considerations should be allowed to impede it.

Mr. Butler said the Government had already indicated their interest in higher technological education by the remarkable developments which had been planned. These would be followed up in the White Paper on technical education.

Mr. Beswick asked whether it was still proposed to call up for national service engineers who had graduated from the institutes.

Mr. Butler said this was a question for the Minister of Labour.

Mr. Usborne considered that while scientists and technicians were so scarce, far too many of them were being attracted to Government establishments making atomic weapons and things of that sort.

Mr. Butler: There is always this great difficulty of spacing out the supply of trained technicians and technologists, and I should like to investigate this point.

Electric Services to Southend Next Year

Mr. Parker asked the Minister of Transport and Civil Aviation what progress had been made with the electrification of the Shenfield-Southend line.

Mr. Harold Watkinson said that electric services between Shenfield and Southend were expected to begin early next year.

Lighting of Pedestrian Crossings

Lieut. Col. Lipton asked the Minister of Transport whether he had completed the examination of the new device submitted to his department which combined the lighting of pedestrian crossings with the flashing beacon.

Mr. Hugh Molson, Parliamentary Secretary, Ministry of Transport said the principle involved in certain experiments conducted in Croydon was examined and rejected as unsound before the present form of pedestrian crossing was adopted. Examination of the experiments in Croydon had not altered this conclusion.

Exports to China

Mr. Low, Minister of State, Board of Trade, informed Mr. Allaun that all facilities were now given for exporting normal types of textile machinery to China.

Mr. Allaun: Will the Minister give an assurance that no difficulties will be created by a ban on electrical equipment which forms part of the textile machinery, particularly in view of the serious redundancy in the textile machinery industry?

Mr. Low: It is a fact that the power units in the machinery are a separate matter and were not covered in my answer; but where the value of the power units has been small in relation to the value of the machinery I think no difficulty has been experienced.

Electrical Machinery on Farms

The need for special regulations concerning safety precautions in the use of electrical machinery and apparatus on farms was referred to during the second reading debate on the Agriculture (Safety, Health and Welfare Provisions) Bill, which implements the recommendations of the Gowers Committee for the benefit of farm workers.

Mr. Tom Williams, a former Minister of Agriculture, said that since the Gowers Committee reported about £300 million worth of machinery and implements had gone on to the farms, and between 70,000 and 80,000 additional farms had been supplied with electricity. Of the 151 fatal accidents in 1954, 63 were due either to machinery or electricity. There had been no statutory power to enforce elementary safeguards in this basic industry. He hoped that it would be possible to make regulations for the adequate lighting of farm buildings.

Mr. William Whitelaw said that many farmers and farm workers told him that their greatest need was electricity and this was not surprising because the North Western Electricity Board's last report stated that there were still 3,480 farms to be connected in the Lakeland Sub-Area alone. It would be unfair to instruct such farmers, through this Bill, to spend money at the very moment when the Electricity Board had once again dashed their hopes of an early supply of electricity because cuts had been made in the capital expenditure programme on rural electrification. He believed the cuts were far in excess of what the Board had been instructed by the Government to do.

Mr. G. Nabarro considered that as mechanization and electrification became nearly universal on farms it would be necessary for the Minister to consider issuing special electricity regulations for farms.

Replying to the debate, Mr. Niall Macpherson, Under Secretary, Scottish Office, said the point about lighting raised by Mr. Tom Williams was covered in the Bill. If machinery indoors was to be safe it needed adequate lighting. He made no reference to the suggested special electricity regulations.

Capital for Nationalised Industries

Mr. Grimond asked the Chancellor of the Exchequer if, in view of paragraph 351 of the Herbert Committee's report, he would review the method of supplying capital to the nationalised industries with a view to ensuring some uniformity in the methods employed, as well as giving consideration to the advantages of some part of their capital being an equity.

Sir Edward Boyle, Economic Secretary, Treasury, said the report was being considered by the Minister of Fuel and Power. Since this particular point involved other nationalised industries besides the C.E.A., it would need to be considered in consultation with other Ministers concerned.

Mr. Gresham Cooke asked the Chancellor of the Exchequer if he would permit the Electrical Contractors' Association to form a hire-purchase finance company so as to enable the members to compete more fairly with the C.E.A.

Sir Edward Boyle replied that the Chancellor would not be disposed to consent to any proposal for expanding finance for hire purchase at the present time.

Air Pollution

Laws to eliminate air pollution must not impose impracticable rules upon industry, Mr. Duncan Sandys, Minister of Housing and Local Government, told the House of Commons committee which began its detailed consideration of the Clean Air Bill in Westminster Hall. He was referring to an amendment which sought to omit the defence that the emission of dark smoke from a chimney was solely due to the use of unsuitable fuel, suitable fuel not being obtainable.

Mr. David Renton, Parliamentary Secretary, Ministry of Fuel and Power, said that in the lifetime of most members of the committee there would probably not be sufficient smokeless fuels for all industrial uses.

Mr Sandys said he was advised that almost all hand-fired furnaces were incapable of being lit up from cold without emitting dark smoke and in the case even of some mechanically-fired furnaces highly-caking, volatile fuels had to be used which could not

be lit up from cold without emitting some dark smoke.

When the debate was resumed Mr. Duncan Sandys, the Minister of Housing and Local Government, said that if members of the Committee could produce evidence to show that it was possible to burn any type of fuel, including the lowest grades of coal, without causing dark smoke, he would consider withdrawing the "unsuitable fuel" defence. But his experts advised him that almost any type of hand-fired furnace would be likely to produce some dark smoke when burning slack, containing a lot of fine coal; and that certain types of mechanical stokers were liable to permit the emission of dark smoke if highly-caking, volatile fuel was being used.

Price Stabilisation

Mr. Nabarro asked the Prime Minister, in view of the need for price stability, whether he would call a conference of the heads of nationalised boards, to be presided over by himself, with a view to evolving a price stabilisation formula and agreement for all nationalised industries during 1956.

Sir Anthony Eden said he hardly thought that all the different conditions could be dealt with by a single formula or by this procedure.

Cross-Channel Cable

Mr. Nabarro asked the Minister of Fuel and Power what progress had been made in the laying of a cross-Channel cable to link certain power installations of the Central Electricity Authority with those of Electricité de France and whether he would state the prospects for a permanent installation to exchange marginal peak-load needs.

Mr. Aubrey Jones said the experimental work in this country and in France had now been virtually completed. The technical experts were preparing a report which it was hoped would be submitted to the respective electricity authorities this summer.

Gas and Electricity Industry Pensions

Mr. Palmer asked the Minister of Fuel and Power if, in view of the publication of the Pensions (Increase) Bill proposing an improvement in the pensions of various classes of public servants, he would make a statement on a comparable improvement in pension schemes taken over under the Electricity Act, 1947, and the Gas Act, 1948.

Mr. Jones replied that the responsibility for reviewing pension schemes and initiating any changes rested with the Boards.

Mr. Palmer said that the Minister's predecessor gave him an assurance that the rates of pensions of electricity and gas pensioners were being looked at. Was not this answer a contradiction?

Mr. Jones stated that the Central Electricity Authority had submitted proposals for adjusting pensions in the light of the Pensions (Increase) Act, 1952. Those were now before him and in due course he would give judgment, but that has nothing to do with the new Pensions (Increase) Bill.

Mr. Palmer asked, in view of that, whether he could expect a statement soon on this important matter.

Mr. Jones replied that responsibility for initiating any pensions changes rested entirely with the Boards.

Herbert Committee's Report

Mr. Palmer also asked what discussions the Minister was having with the Central Electricity Authority and the Area Electricity Boards on the recommendations of the Herbert Committee.

Mr. Jones said he had asked the Authority and each Board to let him have, by the end of this month, their views on the recommendations dealing with the statutory structure of the industry and certain other matters of national policy, and later to supplement these views with any observations they might wish to make on other aspects of the report.

Mr. Palmer asked if it was not desirable that the industry should not be left too long in suspense about the intentions of the Government? Would the Minister give an assurance that if he proposed changes, he would take into consultation all the bodies and interests concerned, particularly the employees in the industry?

Mr. Jones said that he was in entire agreement with the first part of the question. He recognised the fact that this report meant great uncertainty for the industry and he was most anxious to clear away that uncertainty as quickly as possible. With regard to the second part of the question, he had already given an assurance that he would take into account the views expressed.

Electrical Appliance Sales

Mr. Nabarro asked the Minister what part of the moneys authorised by him in respect of new investment and borrowing powers for the nationalised electricity industry during 1955-56 was to be used for such commercial and sales promotional activities as appliance sales and other retail trading.

Mr. Jones: For hire purchase less than 2 per cent of total capital requirements, and negligible amounts for the other activities mentioned.

Mr. Nabarro said that the nationalised electricity industry was devoting increasing sums of money to purely sales promotional activities for all these accessories and appliances. Why should the Treasury guarantee capital for such activities, which were only at the expense of the area boards' private enterprise competitors?

Mr. Jones: Mr. Nabarro must not assume that I am not applying my mind to the problems of the Central Electricity Authority. Indeed, it may interest him to know that I am granting no new finance to the Central Electricity Authority for hire purchase purposes for the financial year 1956-57.

Rural Development Policy

Mr. Whitelaw asked the Minister what consultations he had had with the Central Electricity Authority about a reduction in the Area Boards' capital expenditure.

Mr. Jones said that in recent discussions he had asked the Authority to let him know the effects of a further reduction of capital expenditure in the financial year 1956-57, additional to that proposed in response to his predecessor's request to them last year. He was now considering the report.

Mr. Whitelaw said that many Area Boards were making extremely heavy cuts in their rural electrification schemes which, they said, were due to the Government's policy.

Mr. Jones said he would like to give an assurance that in any re-phasing or reduction in the capital expenditure of the Central Electricity Authority no disproportionate effect would be felt by rural electrification.

Mr. Jay asked if rural electrification was to be cut down.

Mr Jones said it was the Government's policy to alleviate the general load on the economy. In the light of that policy he could not promise that rural electrification would be completely exempted.

Mr. Nabarro said that for seven months he had been trying to find out what contribution to the rearrangement of economic policy was to be made by the C.E.A. Could the Minister say why the chairman of the Authority put into the newspapers last week that he proposed to save £8 million out of his programme, whereas the House was not given such information?

Mr. Jones: I should like to make it clear that there has been no decision with regard to the capital expenditure of the C.E.A. in the year 1956-57.

Fuel Saving and Heat Pumps

Mr. Albu asked the Minister what financial inducements he was now considering to persuade domestic users to install fuel-saving heating appliances.

Mr. Jones said he did not consider that special financial assistance, beyond that provided for in the Clean Air Bill, would at present lead to any significant saving in the domestic use of solid fuel.

Mr. Albu said there was a very high level of purchase tax on the domestic heat pump which would produce three or four units of useful energy for one equivalent unit of electrical energy employed. The tax was having a very serious effect on production.

Mr. Jones said that he would have liked notice of that question.

NEXT WEEK'S EVENTS

Organizers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 27th February

BIRMINGHAM.—James Watt Institute, 6 p.m. I.E.E. South Midland Radio Group. Short papers on "Theory, Applications and Manufacture of Transistors," by Dr. A. F. Gibson, S. W. Noble and B. B. Frusztajer.

CARDIFF.—At the South Wales Institute of Engineers, Park Place, 6 p.m. I.E.E. Western Utilization Group. "The Electrification of the Manchester-Sheffield-Wath Lines, Eastern and London Midland Regions, British Railways," by J. A. Broughall and K. J. Cook.

CREWE.—British Railways Staff Canteen, Eaton Street, 7 p.m. I.E.E. North-Western Graduates' & Students' Section, district meeting. "The Electrification of Railways," by J. Badgzinki.

DERBY.—College of Art, 7 p.m. Institution of Production Engineers, North Midlands Region, Derby Section. "Electronic Controlled Machines," by D. T. N. Williamson.

LEEDS.—24, Aire Street, 6.15 p.m. I.E.S. Leeds Centre. "A Brief Resumé of the History and Development of Mine Lamps," by Miss H. M. Maurice.

LEICESTER. — E.M.E.B., Charles Street, 6 p.m. I.E.S. Leicester Centre. "Lighting for Decoration," by A. E. Hurst.

NEWCASTLE-UPON-TYNE. — Neville Hall, 6.15 p.m. I.E.E. North-Eastern Centre. Chairman's address to the Utilization Section, "The Opportunities, Responsibilities and Recruitment of Professional Electrical Engineers in Industries other than the Electrical Industry," by D. B. Hogg.

STAFFORD.—I.E.E. North Staffs Graduates' & Students' Section. "An Outline of Transmission System Stability," by L. B. Zeederberg, at 7.15 p.m.

Tuesday, 28th February

BATLEY.—Technical College. I.E.E. North Midland Centre. Discussion on "Schemes of Laboratory Work for O.N.C." opened by L. T. Scott.

CAMBRIDGE.—Cavendish Laboratory, School Lane, 8 p.m. I.E.E. East Anglian Sub-Centre. "The United Kingdom Atomic Energy Project," by Dr. J. V. Dunworth.

COVENTRY. — Methodist Central Hall, Warwick Lane, 7 p.m. I.E.E. South Midland Graduates' & Students' Section. "The Measurement of Noise Figure at U.H.F." by C. G. Crossley.

Technical College, 7.15 p.m. A.S.E.E. Coventry Branch. "Transistors."

EDINBURGH.—11, Atholl Crescent, 7.30 p.m. Edinburgh Electrical Society. "Electrical Uses of Aluminium," by C. Bartley.

LONDON.—Savoy Place, W.C.2., 5.30 p.m. I.E.E. Measurement and Supply Sections. "An Evaluation of Two Rapid Methods of Assessing the Thermal Resistivity of Soil," by M. W. Makowski and K. Mochlinski. (Joint meeting).

2, Savoy Hill, W.C.2., 6 p.m. Illuminating Engineering Society. "Lighting Aids for Marine Navigation," by K. Sutton-Jones.

Overseas House, St. James, S.W.1., 11 a.m. Electrical Association for Women, London Branch. Annual general meeting, followed at 12.45 p.m. by buffet luncheon, guest speaker, Mrs. Phyl Hopkins.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North-Western Supply Group. "The Examination of High Voltage D.C. Testing Applied to Large Stator Windings," by R. T. Rushall and J. S. Simons.

Wednesday, 29th February

BRIGHTON.—Technical College, 6.30 p.m. I.E.E. Southern Centre. "The Electrification of the Manchester-Sheffield-Wath Lines, Eastern and London Midland Regions, British Railways," by J. A. Broughall and K. J. Cook. (Joint meeting with the Southern Branch of the Institution of Mechanical Engineers).

CHIPPENHAM. — I.E.E. Western Centre. "A.C. Traction," by A. Mandl.

GLASGOW.—39, Elmbank Crescent, 7 p.m. I.E.E. South-West Scotland Sub-Centre. "Germanium and Silicon Power Rectifiers," by T. H. Kinman, G. A. Carrick, R. G. Hibberd and A. J. Blundell.

39, Elmbank Crescent, 8 p.m. A.S.E.E. Glasgow Branch. "Electrical Oils and Maintenance," by Mr. Werrell.

St. Enoch Hotel, 7.30 p.m. Institution of Engineering Inspection, West of Scotland Branch. "Inspection of Fractional H.P. Motors," by E. S. Booth.

LONDON.—Savoy Place, 6.30 p.m. I.E.E. London Graduates' & Students' Section. "Television Outside-Broadcast Units," by F. H. Steele and K. T. D. Hughes.

School of Hygiene & Tropical Medicine, Keppel Street, 6.30 p.m. British Institution of Radio Engineers, London Section. Discussion on "Technique of Microwave Measurements," opened by E. M. Wareham.

ROCHESTER. — Bull Hotel, 7 p.m. Incorporated Plant Engineers, Kent Branch. Annual general meeting.

RUGBY.—College of Technology & Arts, 6.30 p.m. I.E.E. Rugby Sub-Centre. "Some Recent Developments in Particle Accelerators," by J. D. Lawson.

Thursday, 1st March

CHELMSFORD. — Hoffmann's Social Hall, 7.30 p.m. Chelmsford Engineering Society. "Stereophonic Sound," by W. I. Heath.

CROYDON.—Half Moon Hotel, Broad Green, 8 p.m. A.S.E.E. South London Branch. "Electricity in Ships," by E. J. Penny.

GLASGOW. — 39, Elmbank Crescent, 6.30 p.m. I.E.S. Glasgow Centre. "Fluorescent Lamp Circuits and Faults," by W. A. R. Stoyle, followed by annual general meeting.

39, Elmbank Crescent, 7.30 p.m. Institution of Production Engineers, Glasgow Section. Annual meeting and open discussion.

LEEDS.—1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "Design, Performance and Application of Miniature Circuit Breakers," by H. W. Wolff and T. G. F. Atherton.

LONDON.—Savoy Place, W.C.2., 5.30 p.m. Institution of Electrical Engineers. Discussion on "Recruitment to the Engineering Profession," followed by film.

MANCHESTER. — College of Technology, Sackville Street, 6.30 p.m. British Institution of Radio Engineers, North-Western Section. "The Design and Application of Quartz Crystals," by R. A. Spears.

NOTTINGHAM. — E.M.E.B., Smithy Row, 6 p.m. I.E.S. Nottingham Centre. "Lighting for Photography," by R. W. Unwin.

Friday, 2nd March

BELFAST.—Grand Central Hotel, 7.30 for 8 p.m. Belfast Association of Engineers. Annual dinner and dance.

BIRMINGHAM.—Grand Hotel, 7 for 7.30 p.m. Birmingham Electric Club. Dinner-dance.

CARLISLE. — Technical College, 7 p.m. I.E.E. North-Eastern Centre. "Colour Television," by Dr. G. N. Patchett.

EDINBURGH.—George Hotel. I.E.E. Scottish Centre. Dinner.

Incorporated Plant Engineers, Edinburgh Branch. Annual dinner.

FAWLEY.—Copthorne House, 7 p.m. Society of Instrument Technology, Fawley Section. "Control Engineering and the Automatic Process Plant," by D. S. Townend.

KENILWORTH.—Chesford Grange, 8.30 p.m. I.E.E. Rugby Sub-Centre. Engineers' Ball. (Jointly with the Rugby Engineering Society).

LIVERPOOL.—9, The Temple, 24, Dale Street, 7.30 p.m. A.S.E.E. Liverpool Branch. "Electronics in Industry," by A. Williams.

LONDON.—1, Birdcage Walk, S.W.1., 6.45 p.m. Institution of Mechanical Engineers, Steam Group. Discussion on "British Standard Code for Acceptance Tests on Steam Generating Units."

Palmerston Restaurant, Bishopsgate, 7 for 7.30 p.m. Institute of Welding. Joint annual dinner of London Branches.

MANCHESTER. — Engineers' Club, Albert Square, 6.45 p.m. Manchester Association of Engineers. "The Application of Electronics to Machine Tool Control," by J. A. Stokes.

NOTTINGHAM.—Victoria Station Hotel, 7 for 7.30 p.m. I.E.E. East Midland Centre. Annual dinner.

PLYMOUTH. — S.W.E.B. Demonstration Theatre, 2.30 p.m. Association of Public Lighting Engineers, South Western Section. "Recent Development in Street Lighting in the City of Plymouth," by N. Axford and "Recent Development of Stores and Buildings in Plymouth and Neighbourhood," by K. M. Roberts.

SOUTHAMPTON. — Polygon Hotel, 8 p.m. Institution of Production Engineers, Southern Region, Southampton Section. Annual general meeting.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 1st March:—

PYE (design). No. 735,234. PIE. No. 734,114. PYE. No. 735,235. Class 9. Radio apparatus and parts; gramophone pick-ups, microphones, amplifiers, and loud speakers, all for use in the electrical reproduction of sound; television apparatus and parts; electric oscillation generators; batteries; accumulators; germanium diodes, transistors and other semiconducting devices for use in electric and electronic apparatus; echo-sounding instruments and apparatus; and gramophones.—Pye, Ltd., Radio Works, St. Andrews Road, Cambridge.

MAGNA-LITE. No. 744,709. Class 9. Electric switches fitted to or adapted for fitting to vehicle steering columns and actuated by movement of the steering wheel; and automatic electric switches for the control of flashing light signals.—Magnatex, Ltd., Harlington Works, Bath Road, Harlington, Middx.

KETAY. No. 747,695. Class 9. Electrical apparatus and instruments; and radio and television apparatus.—Ketay Ltd., 56, Vicarage Lane, Ilford, Essex.

National Packaging Conference

In view of the remarkable progress made by all kinds of packaging processes, the Institute of Packaging is organising a conference at Brighton from 12th to 14th April. The theme of the conference will be "Progress in Packaging". There will be two sections, one dealing with consumer and the other with non-consumer goods. The main session of the conference will be opened by the Institute's president, Mr. J. E. Evan Cook, on 13th April. The whole of the day will be taken up with discussion sessions, culminating with a conference dinner in the evening. There will be a final session on 14th April, concluding at lunch. Details of the conference can be obtained from the Institute, 20, Took's Court, London, E.C.4.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—26th March. Electricity Commission of New South Wales. Seven 15,000 kVA transformers. (E.S.B. 2747/56. Ten/17814.)*

28th March. Electricity Commission of Victoria. Transformers and lightning arrestors. (E.S.B. 3789/56. Ten/17977.)*

Bicester.—7th March. U.D.C. Street lighting equipment. (See this issue.)

Broadstairs and St. Peter's.—6th March. U.D.C. Electrical goods for the year ending 31st March, 1957. Surveyor, Pierremont Hall, Broadstairs, Kent.

Burma.—2nd March. Union of Burma Purchase Board. 100 fluorescent fittings. (E.S.B. 3889/56. Ten/17981.)*

Edinburgh.—North of Scotland Hydro-Electric Board. 3.3 kV cables, auxiliary cables and earthing system for Dalchonzie power station. (See this issue.)

Hastings.—29th February. Borough Council. Electrical installations in 80 dwellings. (See this issue.)

Hayes and Harlington.—U.D.C. Street lighting installation. (See this issue.)

Heston and Isleworth. — 9th March. Borough Council. Street lighting equipment. (See this issue.)

High Wycombe.—14th March. Borough Council. Street lighting equipment. (See this issue.)

India.—29th February. Director General of Supplies and Disposals, New Delhi. Electric furnace. (E.S.B. 3678/56. Ten/17966.)* 6th March. Transmitters and accessories. (E.S.B. 3691/56. Ten/17951.)* 16th March. Government of Saurashtra. Mercury arc rectifiers. (E.S.B. 2561/56. Ten/17798.)* 1st March. Government of Madras Electricity Department. Air break and disconnecting switches. (E.S.B. 2968/56. Ten/17782.)* 15th March. Aluminium and copper busbars. (E.S.B. 3641/56. Ten/17930.)* 20th March. Government of Mysore, Stores Purchase Committee. Distribution transformers. (E.S.B. 3609/56. Ten/17970.)*

Iraq.—2nd April. Government Development Board. Six boiler units for Dibis and Baghdad power stations. (E.S.B. 23761/55. Ten/17889.)*

London.—India Store Department. Spares for army radar equipment. (See this issue.)

Manchester.—5th March. Waterworks Committee. Two sluice valves and one discharge regulator, complete with electrical control gear. (See this issue.)

Mitcham.—3rd March. Borough Council. Street lighting equipment. (See this issue.)

New Zealand.—28th March. Director General, Stores Division, G.P.O., Wellington. Eighty 500 W and fourteen 1,000 W transformers. (E.S.B. 3531/56. Ten/17923.)* 29th March. 200 resistors. (E.S.B. 3532/56. Ten/17925.)* 30th March. 12,000 switchboard lamps. (E.S.B. 3615/56. Ten/17926.)*

Normanton.—29th February. U.D.C. Replacement of two gas-driven sewage pumps by electrically-driven pumps. Surveyor, Council Offices, High Street.

Pakistan.—13th March. Government Posts and Telegraphs Department. Carrier telephone systems. (E.S.B. 3573/56. Ten/17954.)*

Persia.—12th March. Iranian Tobacco Monopoly, Teheran. Transformers and control boards. (E.S.B. 3029/56. Ten/17929.)* 4th April. Iranian State Railways. Diesel generating sets ranging from 8 kW to 200 kW. (E.S.B. 3115/56. Ten/17827.)*

Rhodesia and Nyasaland.—12th March. Federal Hydro-Electric Board. 1,500 kVA outdoor type diesel generator step-up transformers and outdoor type distribution transformers, 100-300 kVA. (E.S.B. 3583/56. Ten/17922.)*

South Africa.—7th March. Stores Department, South African Railways. Two electric furnaces. (E.S.B. 3607/56. Ten/17911.)*

Staffordshire.—1st March. Education Committee. Electrical repairs and installations in schools. Divisional education officer, Education Offices, Walsall Street, Wednesbury.

Syria.—29th February. Posts, Telephones and Telegraph Department, Damascus. Neoprene cable. (E.S.B. 3387/56. Ten/17872.)*

Thailand.—5th March. State Railway, Bangkok. Railway track and maintenance equipment, including copper wire, 125 kW diesel generator set, six 1-ton electric hoists and an electrically driven air compressor. (E.S.B. 3107/56/ICA. Ten/17884.)*

Uruguay.—10th April. Usinas Electricas y los Telefonos del Estado. Auxiliary apparatus for telephonic installations. (E.S.B. 3432/56. Ten/17927.)*

Warrington.—8th March. R.D.C. Street lighting equipment. (See this issue.)

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

ORDERS PLACED

Durham.—County Education Committee. Electrical installations in schools: Bishop Auckland New Technical College (£9,321).—Doves (in place of tender withdrawn). Bowburn New Modern School (£8,113) and Trimdon New Village Hall (£966).—North of England Engineering and Electrical Co.

Glasgow.—Education Committee. Electrical installations in primary school at Drumchapel, site No 11 (£3,286) and site No 20 (£3,434).—James Kilpatrick & Son.

London.—Battersea Borough Council. Electrical installations in 112 flats at Dagnall Street housing scheme (£8,411).—Alpha Manufacturing & Electrical Co.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Acton. — Works and offices, Western Avenue; Acton Bolt Co., Ltd., Chase Road, London, N.W.10.

Beeston.—Chilwell Sunnyside C.P. School, for Notts. E.C.; A. G. Clower, Ltd, Mansfield Road, Daybrook, Nottingham.

Birmingham.—Handsworth Church Lane Boys' School; Percy W. Cox, Ltd, Grove Lane.

Gooch Street redevelopment, including flats, houses, and shopping centre; A. G. Sheppard Fidler, city architect, Civic Centre, 1.

Bottesford.—Secondary school and community centre (£120,000); county architect, Leicester.

Cardiff.—Works and offices, Mardy Industrial Estate; M.A.C. Engineering, Ltd., Downton Lane, Rumney.

Colchester.—Showrooms and offices, 35-37, High Street; Fenn, Wright & Co., surveyors, 146, High Street.

Crook.—Public library; county architect, Durham.

Driffield.—Bus garage (£47,000) for the East Yorkshire Motor Services, Ltd., 252, Anlaby Road, Hull; Gelder & Kitchen, architects, 120, Alfred Gelder Street, Hull.

Durham.—Houses (48), at Framwellgate Moor; J. W. Green, city engineer.

Ealing.—Flats (240), Fox Avenue site; Taylor Woodrow Builders, Ltd., Adrienne Avenue, Southall.

Eccles.—Additional plant and buildings; Lankro Chemicals, Ltd., Bentcliffe Works, Salters Lane.

Great Yarmouth.—Casualty and outpatients' department at General Hospital; J. Stinton Jones & Partners, consulting engineers, 21, Gloucester Place, London, W.1.

Halesowen. — Primary school, Howley Grange; Richard Sheppard & Partners, architects, 5, Southampton Place, London, W.C.1.

Hebburn.—Factory and offices; British Arc Welding Co. (North-East), Ltd., Wapping Street, South Shields.

Hexham.—Houses (175); W. A. Hancocks, U.D.C. surveyor.

London.—Luxury flats (36), Lowndes Square, Chelsea; Holloway Bros., Ltd., builders, 157, Millbank, S.W.1.

Office block, Bishopsgate; Norman Green, architect, 12, Adeline Place, Bedford Square, W.C.1.

Rebuilding Gaumont Cinema, Holloway Road; Circuits Management Association, Ltd., 59, New Oxford Street, W.C.1.

Longbenton.—Houses (150) and shops (6) at Westmoor; Stephenson, Gillis and Partners, architects, Saville Chambers, Newcastle-on-Tyne.

Manchester.—Houses (197) at Vernon Road, Bredbury, for T.C.; Eric Entwisle, Ltd, Altrincham, Ches.

Meriden.—Houses (50), Gun Hill, Arley; B. L. Stephenson, R.D.C. surveyor, Old Vicarage, Coleshill.

Middlesbrough.—Block of flats on tramsheds site; J. A. Kenyon, borough engineer.

Conversion of "Ashgate", Roman Road, into College of Art (£69,000); K. J. Caton, education architect.

Morpeth.—Offices and Council Chamber, Dacre Street; J. R. Miles, R.D.C. surveyor.

Newcastle-on-Tyne.—Houses (44) on Section "C" of the Longbenton estate, and flats (39) at Ropery Walk; city architect, 18, Cloth Market.

Southport.—Industrial estate, Dock Lane; R. K. M. Sydell, 13, Compton Road, London, N.21.

Spennymoor.—Fire station; county architect, Durham.

Stamford.—Rewiring of Stamford Hospital (£10,000) and additional storey on Nurses' Home; F. J. Lenton & Partners, architects, Broad Street, Stamford, Lincs.

Stockton-on-Tees. — Showrooms and offices; Cowie's of Sunderland, Matamba Terrace, Sunderland.

Sunderland.—Flats (108), Farringdon; borough architect, Grange House, Stockton Road.

Sutton Coldfield.—Dwellings (104), Kingshurst estate; H. Dare & Son, Ltd., builders, 962, Alum Rock Road, Birmingham, 8.

Tynemouth.—Industrial buildings on 25-acre site for James A. Jobling and Co., glass manufacturers, Wear Glassworks, Sunderland.

Methodist church, school and hall at the junction of Mast Lane and Broadway (£47,000); Cackett, Burns and Mackellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Wallsend.—Office block (£30,000); Victor Products, Ltd., Church Bank, Wallsend.

Warrington.—Bus depot at Winwick for the Lancashire United Transport Co., Ltd., Atherton.